The Research Journal

Creating friction-less digital financial journeys

Foreword

The power of frictionless finance

"Frictionless finance" is a phrase we use to describe an ideal state for customer journeys in financial services. In all our customer engagements and in our product development agenda, we are constantly striving to eliminate or reduce the obstacles i.e. friction, between customers and their financial goals and objectives.

Frictionless finance manifests in many ways, for instance:

• Single sign-on and customer 360 view for all aspects of the customer relationship which helps customers get a complete view of their financial picture when they sign in;

• Intelligent self-service that anticipates customer queries, with seamless hand-off to agent channels on customer request;

• Automated rebalancing of customer portfolios to match risk profiles and investment horizons; and,

• Ensuring that corporate actions information flows quickly and effortlessly between issuers and investors.

From the front office to the back office, be it retail or commercial banking, be it the custody value chain or a private wealth management scenario, we constantly seek new ways to create smoother customer journeys.

Equally important though is knowing when friction is necessary. Just as a frictionless highway would be unsafe, so would be a "one-click" SMS that empties your bank account. Our goal is to have frictionless customer journeys leading to the moments where friction is necessary and appropriate. It could be moments when a major investment decision or payment is being made, and so on. This ensures risk mitigation for the institution and the end customer with necessary guard rails. In other words: frictionless" in the engine with essential friction on the streets.

Just as on the highways, friction ensures the needed traction for customers to travel in whatever direction they choose. We measure our success in part based on how well we achieve this state of "frictionless" in our endeavors.

In this issue of the TCS BaNCS Research Journal, we highlight several examples across commercial lending, retail transaction banking, asset servicing, etc., as we constantly set the bar higher towards this goal.

Our product design and architecture encapsulating business functionality across well-defined solution components and/or microservices and exposing them via granular APIs of the right grain keeps this notion of reducing friction as an essential element.   We have a wide range of partners in the TCS BaNCS Ecosystem offering complementary solutions which further enhance this aspect. Delivering and supporting installations on the cloud, be it private or public, is another dimension which serves to deliver solutions faster and makes integrations more seamless thereby enhancing the frictionless experience.

in our client engagements, we have been able to embed the latest technologies including AI and machine learning technologies into business processes and by doing so, we have both eliminated friction and added intelligent support at key decision points in the customer journey.

Welcome to the world of frictionless finance.

Venkateshwaran Srinivasan
Global Head,
TCS Financial Solutions (TCS BaNCS)

Single event processing in corporate actions

The below diagram depicts the overall flow of the corporate actions data between events of different entities using a Hub and Spoke model.
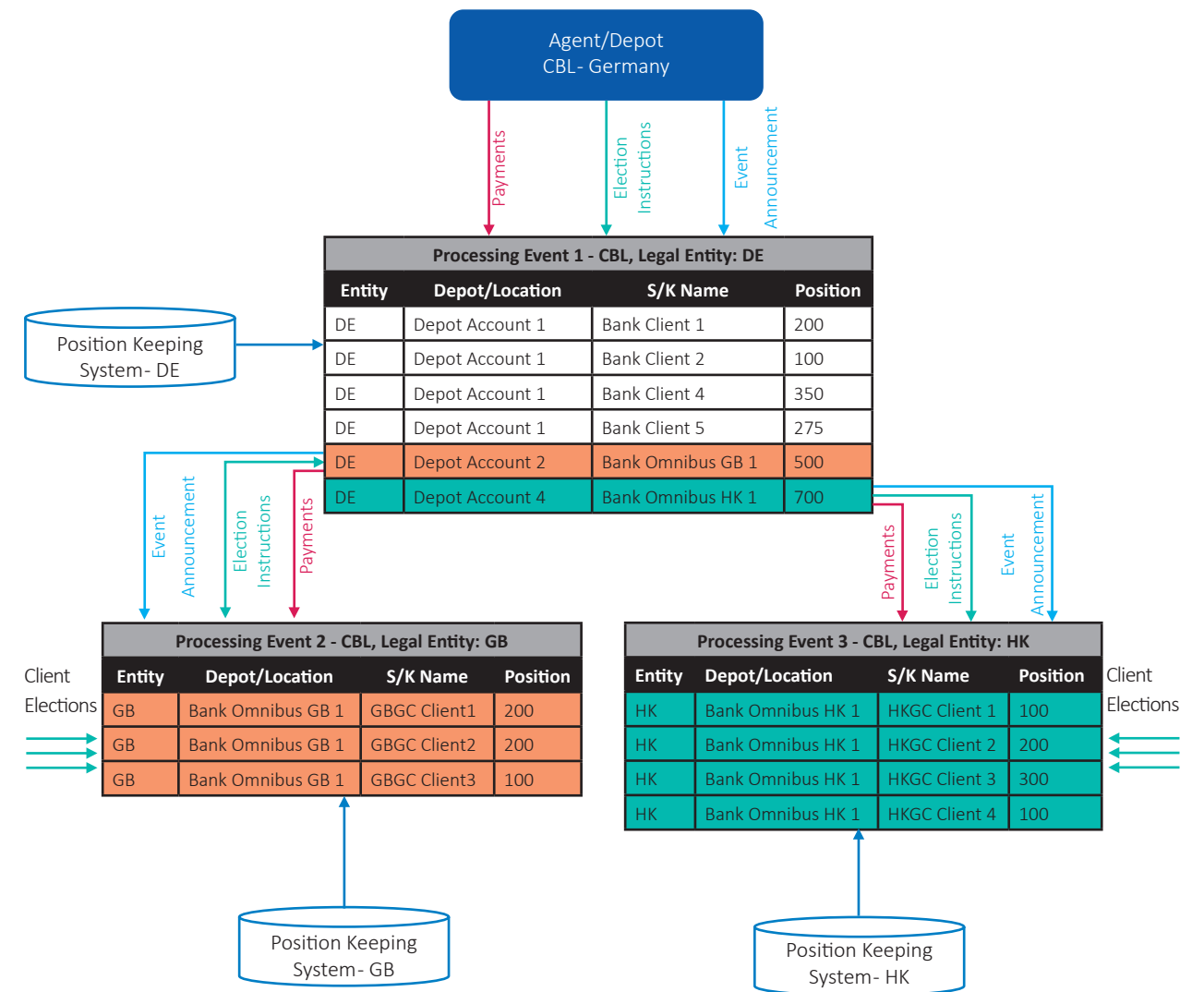

Traditional way of Processing Corporate Action Events in Large Custodian Banks

Traditionally, large custodian banks had multiple position keeping systems and asset servicing systems that were servicing their different entities. In some cases not only were the systems different, but they were also using multiple technologies and were specifically sourced or developed for a specific market. The biggest drawback of this decentralization model was that the same event is being processed multiple times across all the different entities of the same bank. This leads to processing inefficiencies and duplication in the asset servicing value chain which also increases the number of FTE's, reduces the controls and increases the risk. The nature of this process has resulted in the end client receiving a late announcement of an event, and an (inferior) early election deadline, and losing investment opportunities.

From a corporate actions processing perspective there are multiple 'to and from' flows between the Global Custody (GC) Client accounts and the Intermediate accounts at Local Custody (LC) entity. These flows include

a. Sending of CA announcement from the LC entity "DE" to the GC entity "GB" and "HK" – "DE" receives event from source, creates an event and sends event notifications to all its clients including "HK" and "GB" omnibus accounts.

b. Deadline setting is based on the location of the LC entity plus own processing requirement; for instance, if market deadline is 5pm CET, and "DE" entity needs four hours to process, it would be midday GMT. Also if "GB" entity needs another four hours to process, it would be 5pm GMT (End of day time the day before). On similar lines for the HK entity, adding four hours processing, it will be 8pm HKT, but this will need to be adjusted to say 5pm HKT. However, if the underlying client of each entity may be further located in a different time zone, this deadline could be even earlier.

c. Sending of election instructions from GC to LC.

d. Management of acknowledgements of instructions at GC.

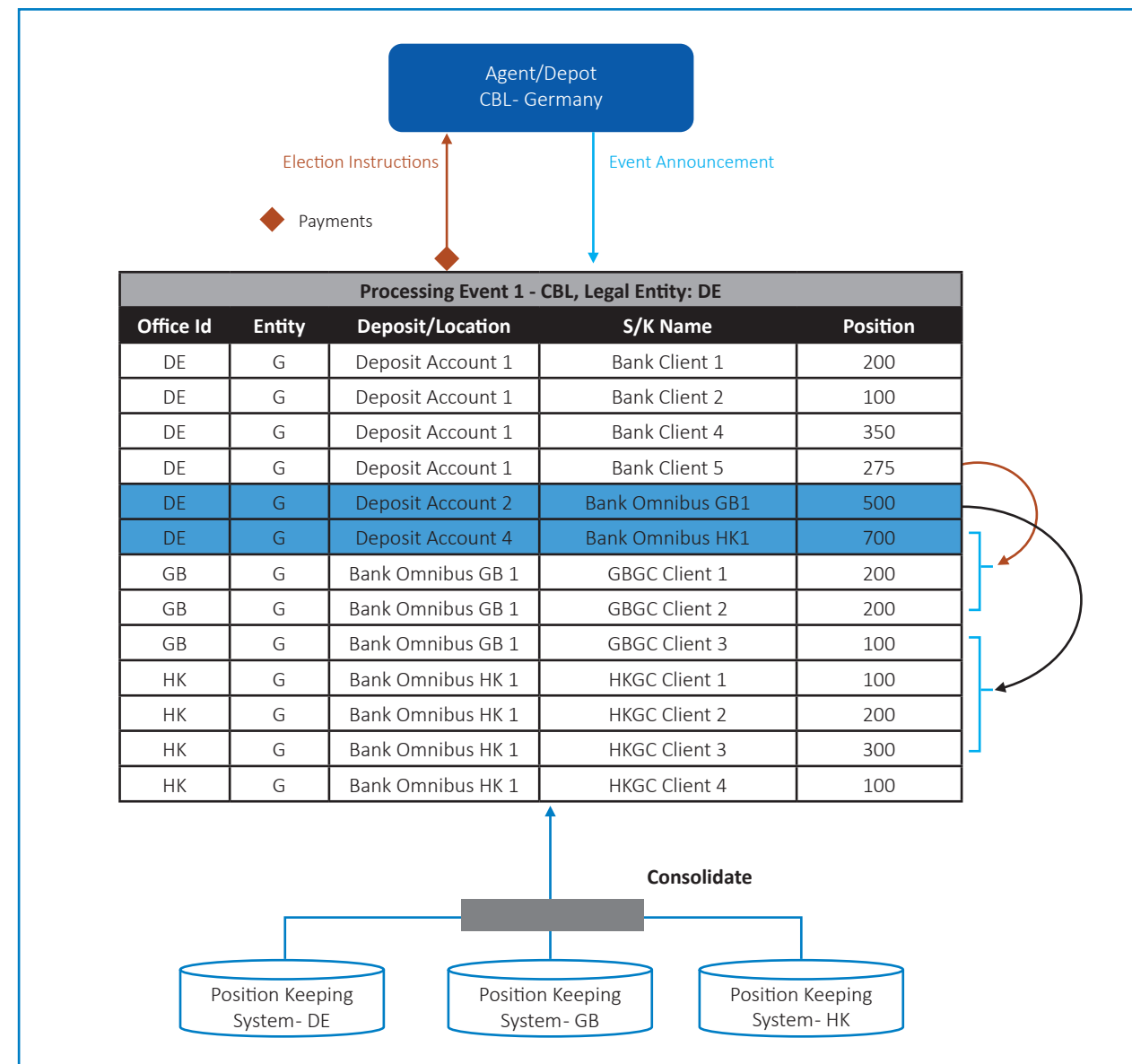f. Sending of payments from LC to GC.

In the above illustration, there are three separate events created, and each are processed independently. The application ecosystem around these three events as well as the operations teams can be different. There is significant duplication of efforts in managing event data. The operational processes/tasks/controls are also separate owing to different processing systems and operations teams. The inter entity flows are typically managed through ISO 15022 standard messages. Any break in STP leads to a considerable lag for the end client to receive the announcement as well as inferior deadlines (In this case the HK and GB Clients) being set.

In summary, this model is not efficient and creates far too many duplicated processes, needing increased operational control and management oversight which leads to a potential increase in operational and reputational risks.

What is Single Event Processing?

Single event processing ensures that a corporate actions event affecting different positions, businesses and

c. Sending of election instructions from GC to LC.

Processing Event 1 - CBL, Legal Entity: DE

Office Id	Entity	Deposit/Location	S/K Name	Position
DE	G	Deposit Account 1	Bank Client 1	200
DE	G	Deposit Account 1	Bank Client 2	100
DE	G	Deposit Account 1	Bank Client 4	350
DE	G	Deposit Account 1	Bank Client 5	275
DE	G	Deposit Account 2	Bank Omnibus GB1	500
DE	G	Deposit Account 4	Bank Omnibus HK1	700
GB	G	Bank Omnibus GB 1	GBGC Client 1	200
GB	G	Bank Omnibus GB 1	GBGC Client 2	200
GB	G	Bank Omnibus GB 1	GBGC Client 3	100
HK	G	Bank Omnibus HK 1	HKGC Client 1	100
HK	G	Bank Omnibus HK 1	HKGC Client 2	200
HK	G	Bank Omnibus HK 1	HKGC Client 3	300
HK	G	Bank Omnibus HK 1	HKGC Client 4	100

Consolidate

Position Keeping System- DE | Position Keeping System- GB | Position Keeping System- HK

entities is processed only once. A single event per a street facing agent enables a global custodian or bank to manage all entitled positions across all branches. The entire "Hub & Spoke Position" stock record model is merged into a set of positions under a single event.

In a solution like TCS BaNCS, all the accounts including the intermediate/linked/omnibus accounts of a typical hub & spoke will be replicated under one legal entity "G" – representing global. The office Id would represent the branch/legal entity that the bank has in its account structure. There will be internal routing (within TCS BaNCS) for the announcement, election and payment messages affecting the intermediate accounts maintained in different branches or entities (In the diagram above Intermediate/Linked/ omnibus accounts are shown in Blue). TCS BaNCS will send/receive the messages to/from the final client and street agents. The necessary BIC transformation is performed in the system to send the messages to end clients, reflecting the actual BIC of the Entity to which the client belongs.

Single event processing:

a. Enables central operations/ center of excellence for managing asset servicing operations at scale globally

b. Achieves lower processing costs / per event of corporate actions – by reducing the number of operations' FTE

c. Provides near to market deadlines for end clients – by removing the processing time required by each entity

d. Provides better client servicing by informing the corporate actions event to clients at the earliest possible time

e. Enables a 'Follow the Sun' processing model

Key Dependencies

While it's possible to establish an operating model for single event processing using TCS BaNCS, there are some upstream and downstream dependencies that need to be considered, which are summarized below:

1. Ability of the custodian bank to consolidate the positions from different position keeping systems across its entities for the security on which the corporate actions event is processed.

2. Single security and client reference data feed.

3. Outcome Booking: While there are different options to send outcomes to the downstream system, the bank should have a uniform booking process across the different entities.

4. User Access: There will not be any data access requirements to restrict users to view client data of a particular Hub/Spoke entity.

While more global custodian banks are trying to innovate with newer business/technology models to provide better client servicing and reduce operational costs, TCS' unique proposition of single event processing leveraging TCS BaNCS for Corporate Actions can help achieve these objectives easily.

Single event processing ensures that a corporate actions event affecting different positions, businesses and entities is processed only once.

Pradeep S
Product Manager,
TCS Financial Solutions (TCS BaNCS)

Eliminating friction in report generation, relationship-based pricing, and cross-entity transactions

TCS created a new relationship pricing module with ample flexibility to support new pricing strategies, including a holistic approach that delivers an enterprise-wise customer relationship with the bank.

When one of our North American clients went live on TCS BaNCS, it marked a major milestone in the North American banking industry's march towards modernization. The core transformation initiative is foundational to the bank's digital transformation objectives: to improve the customer experience, digitize and streamline operations, and better leverage data assets to better serve customers.

The bank's core transformation program brings seven affiliate banks onto a fully integrated core loan and deposit system. This project has served as an impetus for the bank to address customer and employee frustration points, simplify and de-risk how they do business, and adapt to future digital technology, customer, and regulatory expectations. Having a simplified back office and providing significantly greater information to their frontline bankers has also helped them improve customer experience.

In the following sections, we describe three before-and-after scenarios that demonstrate how TCS BaNCS built frictionless digital financial journeys for the bank and its customers.

Operational and MIS report generation

Before: When business users at the bank needed to generate operational, management, regulatory and ad hoc

The core transformation initiative is foundational to the bank's digital transformation objectives: to improve the customer experience, digitize and streamline operations, and better leverage data assets to better serve customers.

reports, they would have to extract data from the core banking system, move it to a separate Enterprise Data Warehouse, and make use of third-party business intelligence software. The process was cumbersome, requiring users to understand the internal processing of these systems down to the individual fields on forms and queries.

After: Drawing upon our contextual knowledge in banking amassed from numerous successful transformation programs at banks worldwide, TCS built a Business Reporting Layer (BRL) providing access to a certified Authoritative System of Record (ASOR) for reporting and research. Instead of making business users do the work, BRL automates the creation of simplified views of data that summarize complex information from the core banking database. Using these pre-calculated views, business users can easily generate consistent reports of complex and commonly required data. This made report generation seamless for users, while also easier for administrators to perform monitoring, auditing, and archiving. The BRL provides a single point of access to SQL, PowerBI, and other analytics tools, allowing developers and business users throughout the company to generate insights from an intuitive and easy-to-interpret database.

Enterprise-wide relationship-based pricing

Before: As part of its loyalty and retention program, the bank wanted to cross-sell and up-sell with incentives on interest rates and lower fees. But, these incentives were not feasible. The bank's existing relationship pricing module was part of a legacy mainframe application tightly coupled with the core banking system, and it was challenging to change any of it, let alone implement a new loyalty strategy.

After: TCS created a new relationship pricing module with ample flexibility to support new pricing strategies, including a holistic approach that delivers an enterprise-wise customer relationship with the bank.

The relationship pricing module allows banks to assemble products with flexible combinations of interest rates, fees, and cash benefits, and then offer them to specific customers that match criteria based on customer, account, and product attributes, and on relationship and transaction patterns. Furthermore, the solution has the flexibility to define how often to reassess customer eligibility for any given offer.

Whether by encouraging customers to use cost-effective channels including voice banking, internet banking, mobile banking, and ATMs; by offering waivers or discounts to the bank's most-valued customers based on account or relationship balances; and by targeting specific segments based on geography, customer attributes, or account details, the bank crafts fee structures to meet any situation. And because the staff has a single view of the customer, the service levels at the branch can be tailored just as easily as any other factor.

The results have been transformative, giving bank relationship managers the tools and offers they need to encourage loyalty and retention.

A co-existence layer for easier walk-in customer transactions

Before: The affiliate banks associated with a single parent company were to be migrated onto TCS BaNCS in a staged, multi-phase process. Nevertheless, customers expected to be able to conduct transactions with any affiliate, regardless of the underlying core banking platform.

After: As a first step, TCS BaNCS created a co-existence layer to ensure that TCS BaNCS and legacy applications could smoothly handle batch and online transactions. However, for cross-affiliate transactions involving cash transaction reporting, fund availability and other complex requirements, a more innovative solution was needed to ensure minimal impact on the customer experience. This solution connected the extensible teller module of TCS BaNCS with the bank's legacy payment processing platform. In affiliate locations where this solution has been deployed, customers can perform transactions on accounts that reside on another affiliate, even if that affiliate has yet to be converted to TCS BaNCS.

These before-and-after examples demonstrate TCS' ability to assess challenging business problems, develop future-proof solutions, and deliver smooth implementations of frictionless business processes.

Sudhir Datir
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TCS Financial Solutions (TCS BaNCS)

Optimizing commercial lending for convenience, speed and agility

Commercial lending in India

India is seeing increasing growth in commercial lending, however, rise in loan value is concomitant with slower growth in origination volumes. This essentially implies that the ticket size in commercial loans is growing; consequently, highlighting the potential for reputational risks that can harm the economy.

Financial institutions and central bank regulators are cognizant of this fact, and have set in measures that aid in shouldering the responsibility of being able to assessing credit worthiness of applicants in an accurate manner.

Standardization and rigor in processes, risk mitigation

Commercial loans assessment has always been long drawn. High ticket loans require detailed assessment, multiple validations for authenticity/accuracy of documentation, as well as multiple levels of approvals and back and forth communication between a borrower and the financial institution. In fact, a recent survey points to "gathering documents efficiently and consistently" as the biggest (38.4%) obstacle in the commercial lending process.

The commercial loans segment is broad encompassing micro, small, medium, mid- and large-corporate businesses. Borrower constitution (sole proprietorship, individual, private limited, partnership, etc.), and type of loan products (term loans, working capital loans, leasing, channel financing, factoring, etc.) significantly impact the credit assessment value chain, the extent of credit checks, validations and underwriting/approval cycles.

More the complexity, higher the turn-around-time (TAT) for processing the application, impacting a borrower's ability to secure timely credit for

business needs. Surveys indicate that more than 90% of commercial lending applications take more than a week to process, with 40% extending beyond a month. The higher TAT is attributable to manual steps, lack of seamless data sourcing, standardization and codification of credit policies as well as regulatory compliance rules.

Financial institutions are not untouched by the increased TAT as they are equally at risk of losing customers to the competition. Not just velocity, they need to be able to competitively price loans considering internal profit measures such as RoE/RoA. A systemic and risk weighted approach to pricing is vital to guarantee consistency and safeguard customer satisfaction in a market replete with neobanks, challengers, and fintech companies. In contrast, a recent industry analyst report states that 31.7% of the FIs set price either by discretion or borrowers' ability to negotiate.

With digital being the new normal, competition for quality borrowers, who are in a sweet spot when selecting a lender, is fierce. Technology-enabled customer experience improvement (e.g., self-service journey enabled through a rich API set), as well as timely identification of problematic loans, appear to be the topmost priorities for financial institutions.

Automating decision-making and curating solutions for a friction-less end user experience

Analogous to retail lending, commercial borrowers are also looking towards agile and nimble lenders/FIs, who can provide a swift frictionless experience.

Automation of credit processes, application data collation and documentation are few areas which are making inroads into the commercial lending realm. The benefits of automation stretch beyond reduction

Surveys indicate that more than 90% of commercial lending applications take more than a week to process, with 40% extending beyond a month.

of TAT and efficiency into enforcing the standardisation of processes too. It eliminates redundant validations and helps in objective decision making and exception tracking.

Making authentic data available to underwriters and decision makers has also freed up employee bandwidth of financial institutions. Bringing additional data dimensions such as information on liquidation resolutions and criminal cases (e.g., insolvency and tribulations' database), or sector specific analytics (e.g., real estate insights for construction finance) also ensure screening of problematic cases early on.

Recent strides by fintech organisations and central governments towards digital initiatives are pushing the boundaries of the art-of-possible. For example, e-signatures have successfully proven to reduce contractual documentation time by up to 80%, expediting tasks which usually take few days to hours. This also takes care of stamp duty applicable

on legal documentation, freeing up considerable time for front office and relationship managers to delve deeper into borrowers needs and strengthen relationships.

Compliance to statutory requirements/ internal credit policy is being built into user experience/lending journeys. Simplified and automated lending assessment journeys using consent based eKYC, credit bureau checks, bank statement analysis, criminal and employment checks reduce TAT by up to 40%, cost of operations by up to 25% and attract borrowers who wish to benefit from a hassle-free lending experience.

However, every FI has its own niche and therefore, origination solutions need to be flexible for the adoption of FI-specific credit policies and user journeys. This is applicable for the initial implementation of an automated origination solution and for subsequent rolling out of changes made to credit policies.

Flexibility to define and orchestrate credit process (cutting across multiple departments) can help financial institutions set up efficient processes for new customers, renewals, and ad-hoc requests. Capability to orchestrate tasks between multiple departments allows for continuous identification of bottlenecks and changed process/ activities for further refinement. This includes business rules for credit approval, and the agility to operate and implement changes without going through lengthy IT change management processes.

Multiple product configurations help them tap into expanding credit needs of borrowers- whether project finance/term loan, working capital needs such as bank guarantee, or a leasing product, while also opening up a broader spectrum of customers to service.

To achieve the above synergies, the origination platform must include comprehensive integration and collaboration capabilities. Integration capabilities enable the institution to not just leverage the power of data inside, but also across the larger fintech ecosystem. A powerful technology architectural layer leveraging real time integration protocols without having to rely on traditional end of day processes is required.

Faster time to market and growth in AUM

Digital technology reduces TAT by up to 97%, NPAs (Non-Performing Assets) by 82%; increase in operational efficiency by up to 30%, while improving quality of assets manifold. If this is not enough, a recent study indicates that 66% of SME (Small and Medium Enterprise) borrowers demand faster and frictionless access to credit.

Therefore, one may question whether lenders have to adopt digital frictionless journeys, instead of operating within the analog, siloed lending landscape. Financial institutions that leverage the power of ecosystems, enable an end-to-end digital lending value chain, and have the right technological components such as process engines and APIfication capabilities are bound to thrive in the new era of frictionless lending.

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Zero-downtime operations during agile rollouts

A leading bank in Switzerland adopted agile delivery as part of a transformation initiative, and the result was a greater number of planned shutdowns of the bank's entire network.

TCS worked with the bank to reduce the impact of these agile upgrades using a Digital Minimal Core that even during a software upgrade, provided a real-time feed of transactions across customer channels, ensured longer availability of ATM and POS services, and maintained consistent availability of accurate balance inquiries.

The high cost of downtime

When ATMs and POS machines are out of service, customers experience significant inconvenience and frustration, and possibly financial losses.

ATMs and point-of-sale (POS) machines have become essential for customers to access their money and make payments during banking hours or after hours from remote locations, offering a lifeline especially for people who do not have access to traditional banking services. ATMs and POS machines also serve as a key connection between banks and their customers, allowing 24/7 interactions and a convenient way for customers to make payments and check their balances.

Starting 2022, a leading bank in Switzerland began running quarterly rollouts as part of a larger transformation initiative. This doubled the frequency of planned shutdowns, which caused added disruption to critical services and a visible impact on end users and customers.

Preparing for a planned outage was a major effort. Even though several tasks were automated, they had to be choreographed precisely across multiple systems with a long lead time for planning and preparation.

From the customer perspective, during a planned outage critical services became unavailable for 90 minutes, and enquiry services were unavailable for an additional 30 minutes. Customers were notified that they would have to withdraw cash in advance, an inconvenience compounded by the confusion caused by outdated customer balances.

The downtime was even more pronounced during any unplanned outage that could take hours to rectify, leading to even higher levels of customer dissatisfaction.

Zero-downtime and channel integration

TCS BaNCS and the bank collaborated on a zero-downtime solution, ensuring availability and enhanced features for ATM and POS services even during software upgrades and rollouts.

Built using the microservices approach to software development, the zero-downtime solution was built with an API that could be accessed by any system, present or future, with minimal local configuration changes. The API connected to a parallel database ("Cashblock") and integration layer ("DataWay") that was designed to maintain balances and transactions even while the core database was being updated.

In addition, TCS BaNCS and the bank developed a solution to propagate any transactions from Cashblock across customer channels as "Authorization Holds," as valid as those sent from the usual systems of record. This approach ensured that the bank provides accurate balance information at all times.

Although this solution was built specifically for the bank, the microservices are easily reusable as a generic solution for any TCS BaNCS customer.

A simple, non-invasive, and frictionless solution

During the bank's most recent software upgrade, the new database handled the switchover even while receiving 375 queries per second, and the "Cashblock" database managed over 400,000 transactions during the downtime window.

The combination of simplicity, non-invasiveness, and frictionless operations was a big success for the bank, which now finds it easier to schedule and plan software upgrades without expensive planning cycles or disruptions to service availability. The microservices-based solution also demonstrates a viable approach for other software development projects at the bank.
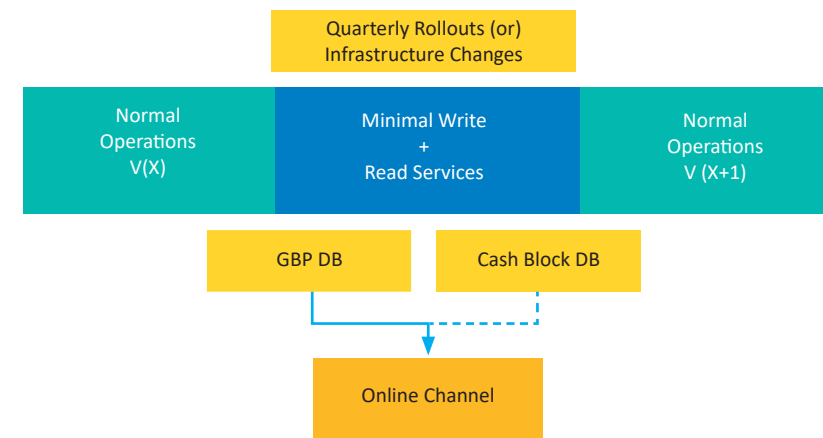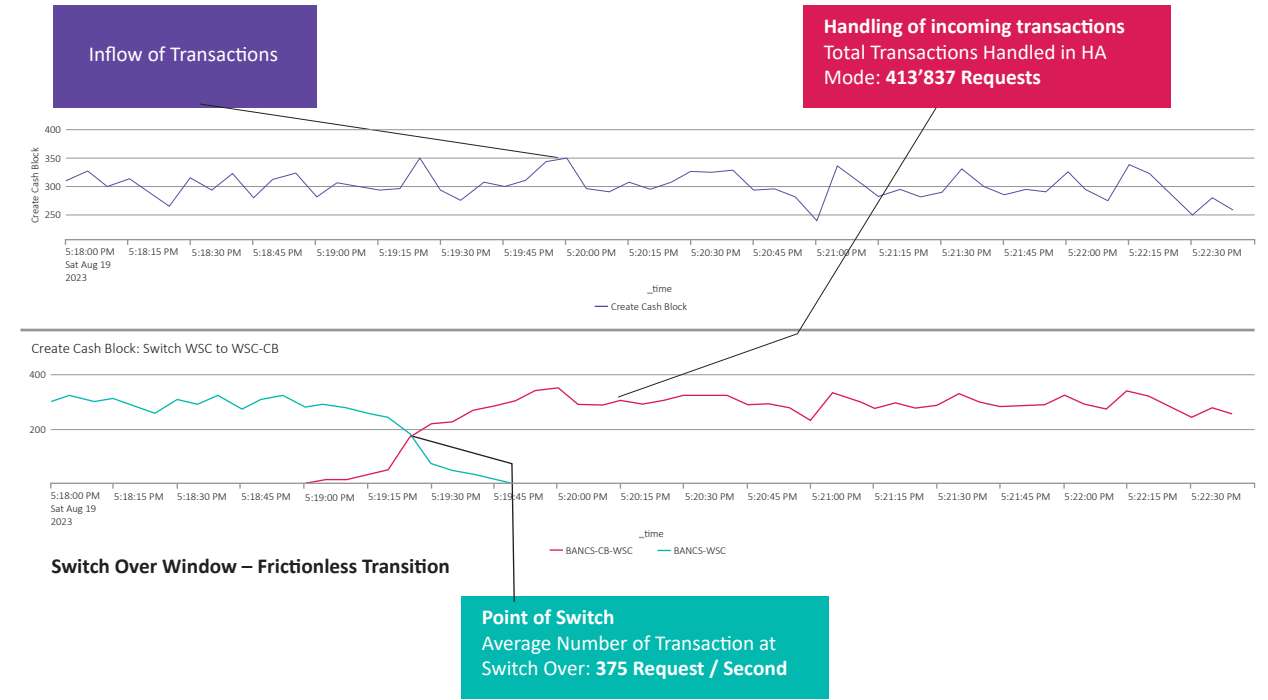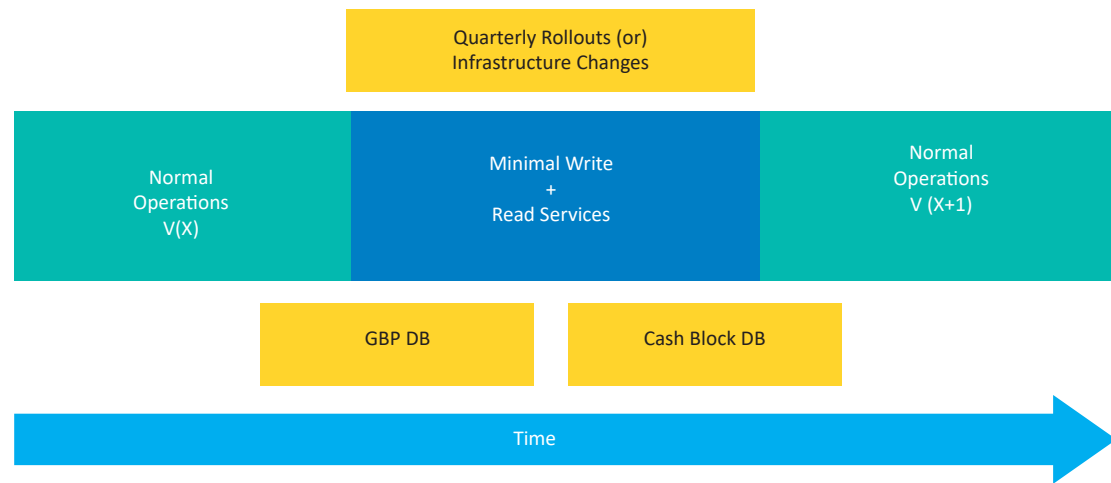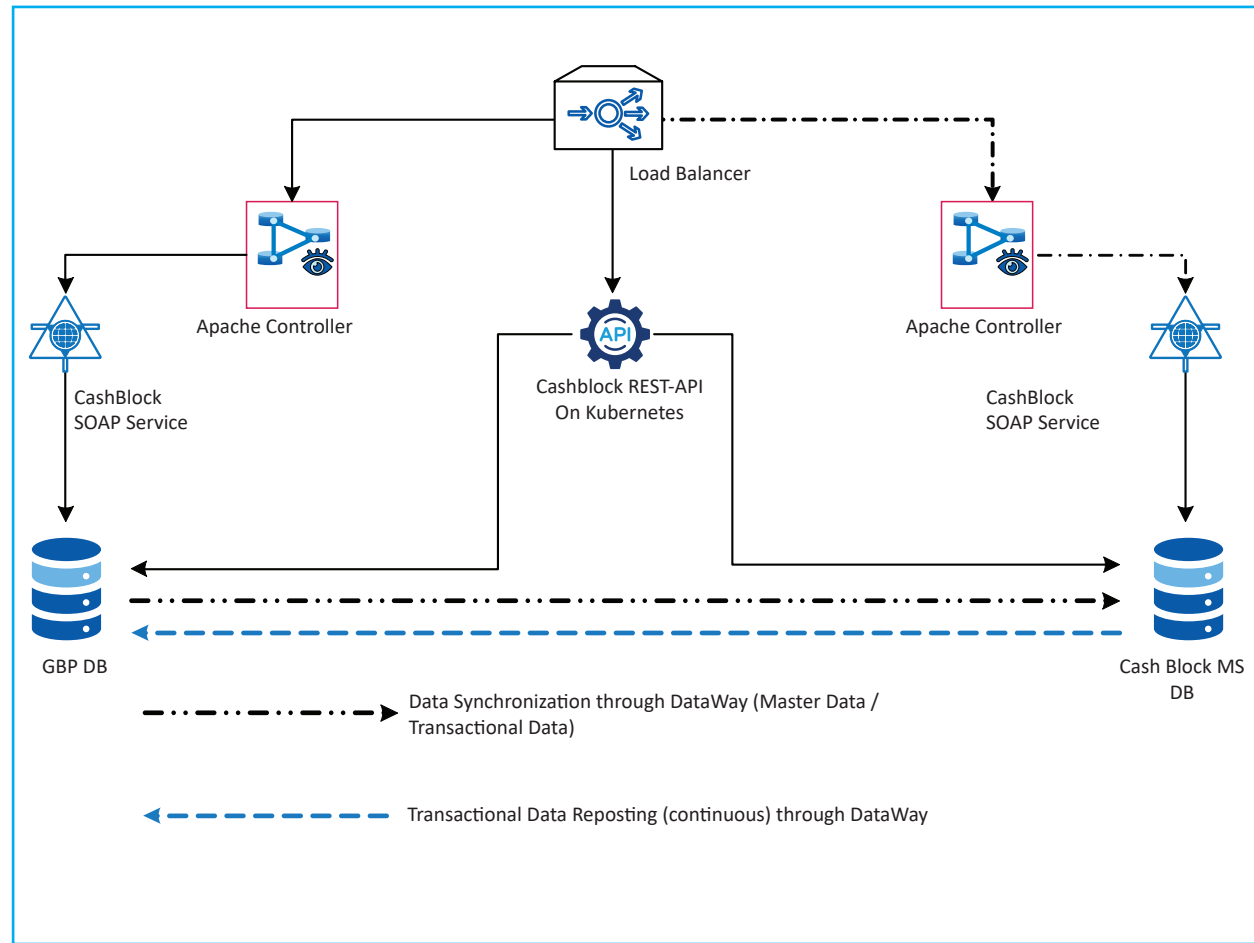
The TCS BaNCS team received a commendation from the bank's executive board: "The switch [to Cashblock] solved a knot that made a new timing possible," said an IT & Operations executive. "The new release timing is a major step and strongly supports our goals as one of the leading digital banks and towards continuous digital availability."

With TCS BaNCS, the bank achieved the goal of zero downtime, with seamless availability of services on all customer channels, all without the need for a major overhaul of core application components. Customers across the bank's retail, business, and corporate footprint also maintaining access to accurate information across channels, with continuous uptime and availability.

Built using the microservices approach to software development, the Zero-downtime solution was built with an API that could be accessed by any system, present or future, with minimal local configuration changes.

During the bank's most recent software upgrade, the new database handled the switchover even while receiving 375 queries per second, and the "Cashblock" database managed over 400,000 transactions during the downtime window.

Load Balancer

Apache Controller

Apache Controller

CashBlock REST-API
On Kubernetes

CashBlock
SOAP Service

CashBlock
SOAP Service

GBP DB

Cash Block MS
DB

Data Synchronization through DataWay (Master Data /
Transactional Data)

Transactional Data Reposting (continuous) through DataWay

Quarterly Rollouts (or)
Infrastructure Changes

Normal
Operations
V(X)

Minimal Write
+
Read Services

Normal
Operations
V (X+1)

GBP DB

Cash Block DB

Time

Inflow of Transactions

Handling of incoming transactions
Total Transactions Handled in HA
Mode: **413'837 Requests**

Create Cash Block: Switch WSC to WSC-CB

Switch Over Window – Frictionless Transition

BANCS-CB-WSC   BANCS-WSC

Point of Switch
Average Number of Transaction at
Switch Over: **375 Request / Second**

Quarterly Rollouts (or)
Infrastructure Changes

Normal
Operations
V(X)

Minimal Write
+
Read Services

Normal
Operations
V (X+1)

GBP DB

Cash Block DB

Online Channel

The combination of simplicity, non-invasiveness, and frictionless operations was a big success for the bank, which now finds it easier to schedule and plan software upgrades without expensive planning cycles or disruptions to service availability.

K.G. Sandeep Kumar
Analyst,
TCS Financial Solutions (TCS BaNCS)

Unlocking the possibilities of frictionless payment experiences with Generative AI
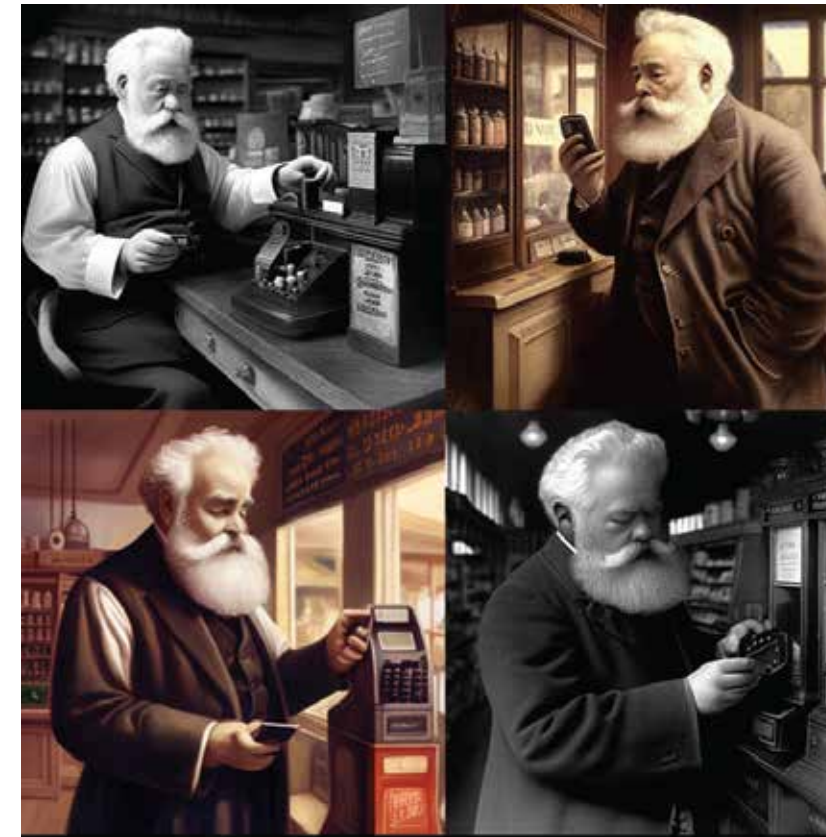

Figure 1: Alexander Graham Bell using a Smartphone to Pay at a store. (Created by Midjourney using Generative AI techniques)

AI (Artificial Intelligence) is a broad term that refers to the ability of machines to perform tasks that would typically require human intelligence, such as perception, learning, reasoning, problem-solving, and decision-making.

AI can be divided into two main categories: narrow or specific AI and generative AI. The main difference between the two lies in the type of tasks they are designed to perform. Specific AI is designed to perform specific tasks or solve specific problems, while generative AI is designed to generate new and original content. Another difference is the training process: AI is trained on specific datasets to perform specific tasks, while generative AI is trained on large datasets to learn patterns and structures within the data, which it can then use to generate new content.

GPT-3 & GPT-4 (Generative Pre-trained Transformer) are examples of a generative AI model. These are language models created by OpenAI and are capable of generating human-like text and images based on a given prompt or input. GPT-3 works with 175 billion parameters and only supports text, while GPT-4 works with 100 trillion parameters and supports both text and images.

Unravelling Frictionless Payment Experiences using Generative AI

Generative AI can have several applications in the world of payment processing

- Fraud Detection: One example is the use of generative adversarial networks (GANs) to detect fraudulent transactions. GANs consist of two neural networks:

a generator network that creates fake data, and a discriminator network that tries to distinguish between real and fake data. By training the discriminator network on real transaction data and then presenting it with fake transaction data from the generator network, the discriminator network can learn to identify and detect patterns of fraud and fraudulent transactions. Another example is the use of natural language processing (NLP) to analyze transaction data and detect anomalies. NLP algorithms can be trained to recognize patterns of language and behavior that are associated with fraudulent activity, such as unusual keywords or phrases in transaction descriptions.

- Frictionless Payment Experiences: Additionally, generative AI can also be used to create personalized payment experiences for customers, such as customized reminders or personalized discounts, or recommendations and offers based on their transaction history. This can improve customer satisfaction and loyalty, as well as increase revenue for merchants.

- Engagement: Generative AI can be used to analyze customer data such as transaction history, browsing behavior, and demographics to identify patterns and preferences. Based on these insights, AI can generate personalized payment reminders that consider the customer's preferred payment method, timing, and frequency. For instance, if a customer usually pays their bills at the end of the month, a reminder that suggests paying the bill a few days before the due date to avoid late payment fees is generated.

- A Personalized Nudge: Another way that generative AI can create

personalized payment experiences is by offering customized recommendations based on a customer's transaction history. For instance, if a customer frequently shops for groceries at a particular store, it can recommend a cashback offer for their next purchase at that store. This not only incentivizes the customer to make the purchase, but also encourages them to return to the store in the future. Generative AI can also be used to create personalized payment offers based on the customer's preferences and behavior.

Creating New-Age Frictionless User Journeys – The Building Blocks

For customized, on-the-spot discount offers and in-the-context payment experiences, the following steps can be taken:

- **Collect data:** Collect transaction data, browsing behavior, and customer demographics to identify patterns and preferences.

- **Analyze data:** Use generative AI algorithms to analyze the data and identify patterns in the customer behavior, such as their preferred products or services, purchase frequency, and average order value.

- **Generate personalized offers:** Based on the insights gained from the analysis, use generative AI models to generate personalized discount offers for the customer's next order. For instance, if the customer frequently orders pizza, AI can generate a discount on their next pizza order.

- **Deliver offers:** Deliver the personalized discounted offer to the customer through the appropriate channel, such as email, SMS, or push notification.

- **Monitor results:** Track the

effectiveness of the personalized discounted offer in increasing loyalty and driving revenue growth.

To leverage generative AI models for customized discount offers, businesses can use Deep Learning techniques such as Natural Language Processing (NLP) and image recognition to analyze customer data and identify patterns in their behavior. These insights can then be used to generate personalized offers for customers, thereby increasing customer loyalty and retention.

For example, a restaurant can use NLP to analyze customer review responses to identify dishes that are most popular. The restaurant can then use generative AI models to personalize discounted offers for popular dishes during the next order, enhancing the likelihood of customers ordering more often from the restaurant.

Conclusion

In summary, leveraging generative AI models to generate personalized discount offers can help businesses increase customer loyalty and retention by providing a more personalized experience for their customers.

Citations: This piece was co-written with GPT-3 to get a nice taste of human-computer co-creation – probably the next new normal. GPT-3 did not spit out the entire article, but it was responsible for combating writer's block, generating complete sentences and paragraphs of text, and brainstorming different use cases. To add some fun, the illustrations were generated through the Midjourney bot on Discord.

Glossary:

Narrow or specific AI is designed to perform specific tasks or solve problems, such as image or speech recognition, or language translation. These AI systems are trained on large

datasets and use machine learning algorithms, such as supervised or reinforcement learning to improve their performance over time.

Generative AI, on the other hand, is a specific type of AI designed to generate new and original content, such as images, text, music, or videos. Unlike traditional AI, which is designed to perform specific tasks or make decisions based on pre-existing rules and data, generative AI learns from large datasets and generates new content that is like the training data.

> **AI is trained on specific datasets to perform specific tasks, while generative AI is trained on large datasets to learn patterns and structures within the data, which it can then use to generate new content.**

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Senior Consultant,
TCS Financial Solutions (TCS BaNCS)
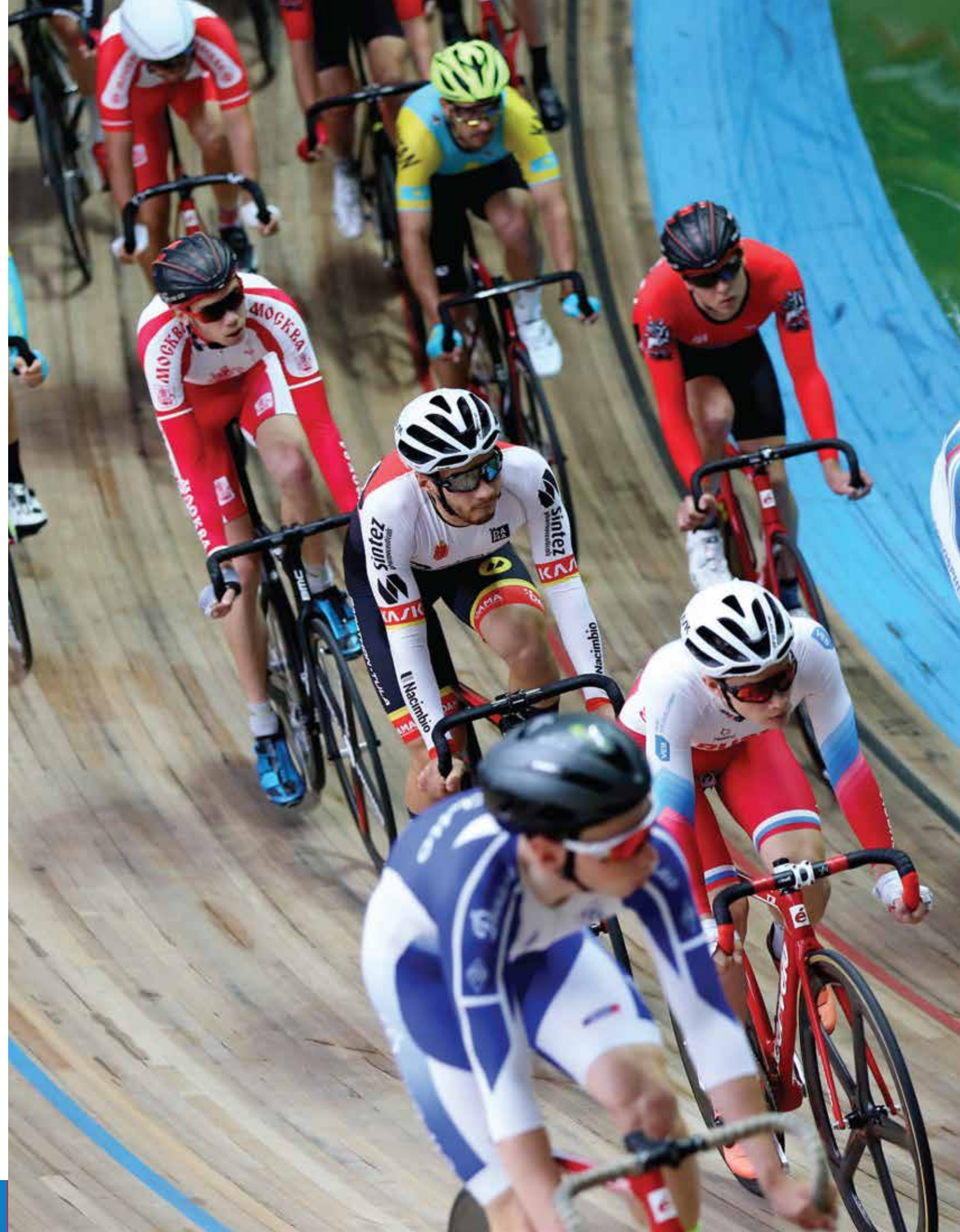
Automated and seamless loan management for a leading Canadian Bank in India

A leading Canadian bank with a significant commercial presence in India automated loan management to comply with the Reserve Bank of India's Income Recognition and Asset Classification (IRAC) norms for classifying assets and providing for bad loans.

TCS provided a comprehensive solution to automate the monitoring of assets, account for bad loans, and report on Non-Performing Loans (NPLs) in full compliance with IRAC.

Seeking compliance with regulatory norms for asset classification

Over more than two decades, a large Canadian bank built up a commercial presence in India with a loan portfolio of corporate, trade and staff loans and working capital facilities.

Due to limitations with its core banking system, the bank was unable to comply with IRAC norms, which require banks to follow objective criteria when classifying assets into categories (e.g. Standard Assets, Sub-standard Assets, Doubtful Assets). The bank's systems were poorly equipped to handle this operation, let alone automate the process.

Loans were booked manually into a system that was unable to keep track of the required IRAC classifications. Asset classifications and Non-Performing Assets (NPA) were tracked in separate spreadsheets disconnected with the core banking system, which made it difficult to identify accounts under watch, and this approach was not in compliance with IRAC norms.

In addition, the bank overly relied upon tactical fixes and manual controls for letter of credit issuance. For example, after the approval of a loan, lending offers would manually check and mark the loan limits before issuing Letters of Credit and associated SWIFT messages. These tactical workarounds and

manual processes exposed the bank to operational risks.

To address these limitations, the bank considered external point solutions for classifying loans, with the results to be fed into its existing core banking system.

Automated loan classifications and trade limits

The TCS BaNCS team, upon being asked to evaluate the situation, found that an external add-on approach would only address some of the IRAC norms, such as calculating Days Past Due (DPD) and classifying overdue loans, without addressing other aspects of IRAC, such as income recognition and reporting. The add-on approach would also forgo the opportunity to make significant functional improvements in limits and exposure management.

TCS BaNCS for Loan Management was implemented within a strict deadline of five months to help the bank reach full compliance with regulatory requirements.

All loans were migrated to TCS BaNCS, which automatically applies rule based NPA classifications to place each loan into various buckets based on solvency and delinquency. The solution also automatically calculates days-past-due (DPD), marks overdue loan accounts, including overdue principal and interest, and changes asset classifications. Consolidated GL, risk reports, and regulatory reports make it easy to identify overdue or restructured accounts, while providing traceability of all user and system actions.

Trade transactions are now booked without manually checking and updating the limits. The application checks for available limits in real time and blocks them for the transaction value upon execution, resulting in increased operational efficiency and mitigation of risks. Using APIs, TCS

BaNCS enabled seamless integration between trade finance and limit processing modules.

Rapid results

Following a five-month deployment of TCS BaNCS, the bank:

- Streamlined the lifecycle for a variety of commercial loans.

- Created an automated mechanism for identifying, classifying, monitoring, accounting, and reporting Non-Performing Loans.

- Established a common limit structure for processing limits and exposure for loans and trade finance products.

- Achieved full and ongoing compliance with IRAC norms and other RBI regulatory requirements.
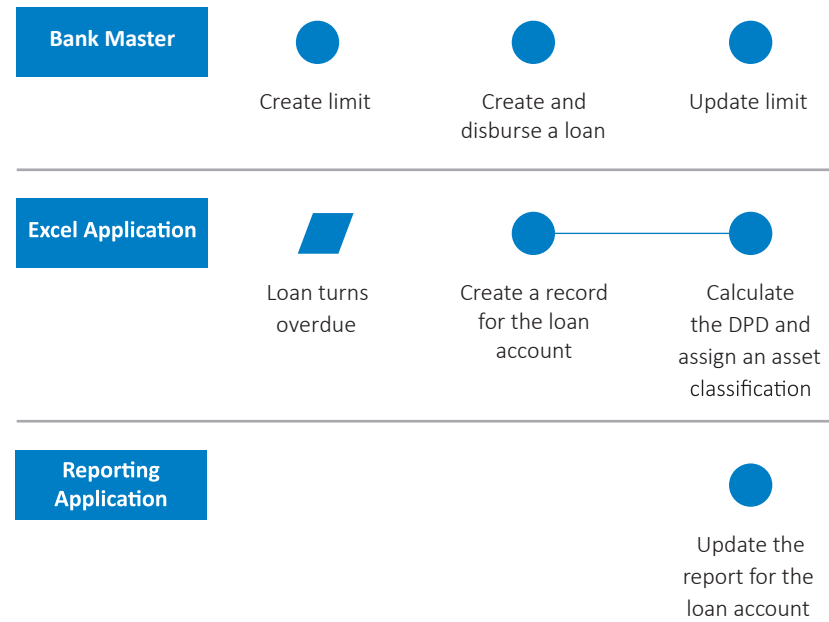
The solution also automatically calculates days-past-due (DPD), marks overdue loan accounts, including overdue principal and interest, and changes asset classifications.

Function	Before TCS BaNCS LMS Implementation	After TCS BaNCS LMS Implementation
Loans Management	1. Various types of business loans and staff loans were booked in the Bank Master. 2. The bank was unable to change the asset classification rules in the system to match the prescribed classifications by Reserve bank of India. 3. The existing application was not able to automatically assess the overdue loans and assign the applicable NPA stage. 4. NPA classification was being maintained in excel, outside the CBS. 5. It was not easy to identify the Accounts which were restructured and hence under watch. 6. Any upgrade of the account classification was also maintained outside the system. 7. Non-compliant to regulatory norms.	1. All loans were migrated to, and new loans were opened in TCS BaNCS. 2. TCS BaNCS' rule based NPA classification helped the bank define the various delinquency buckets and the corresponding classifications. 3. Automatic classification of the overdue loans in the buckets and auto update of asset classification. 4. Automatic upgrade of account classification in case of recovery. 5. Restructured accounts were easily identifiable, and the account watch status was marked automatically. 6. Complete traceability of all user and system actions related to the account classifications. 7. Complete compliance to regulatory asks.
Limits Management	1. Limits were created in the Bank Master. For letter of credit issuance, the trade operations team did a manual check for the available limit in Bank Master, and then created the transaction in the trade application. 2. The limit update for trade transactions was being done manually. 3. The mandatory check to validate the limit update and accounting of LC before issuance of SWIFT message was being performed through a tactical workaround.	1. Existing limits were migrated to TCS BaNCS. All new facilities were created in TCS BaNCS. Limit marking was seamlessly done for loans created under a facility structure. 2. Trade application was integrated to TCS BaNCS for limit management, and limit availability checks and limit utilization updates were marked online, real time, through APIs. 3. The limit update and accounting for issuance of LCs was immediate and by the system and the input was passed to the trade application for the SWIFT issuance.
Benefits Realised		

1. Configurable and automated NPA management process

2. No manual intervention or monitoring required

3. Regulatory compliance

4. Risk free consolidated exposure management

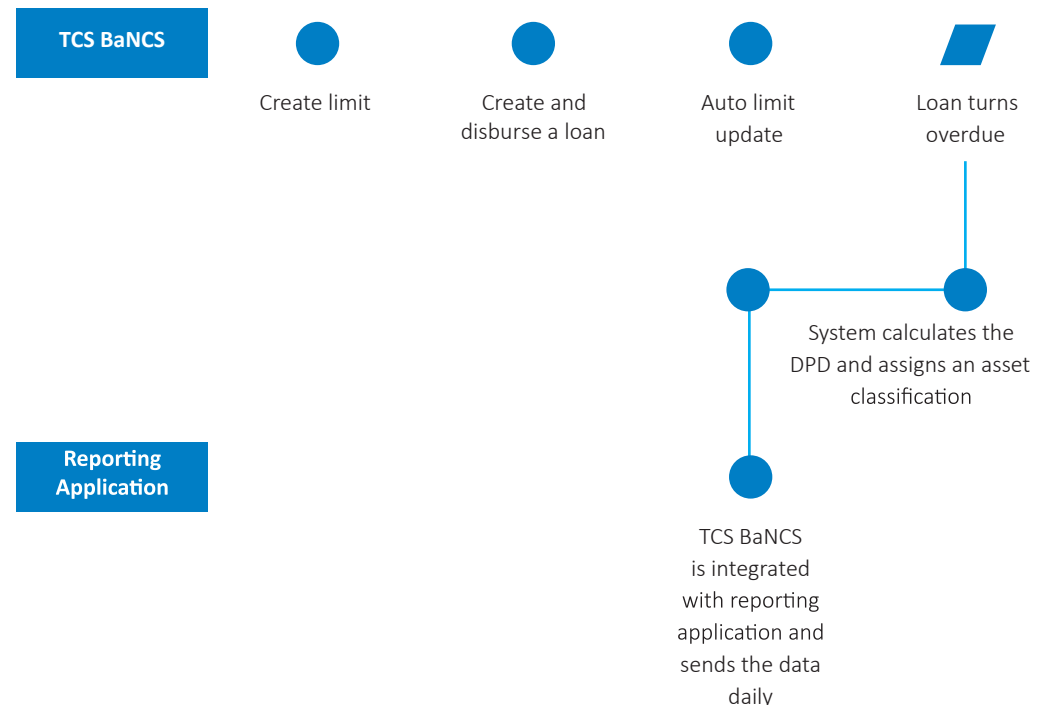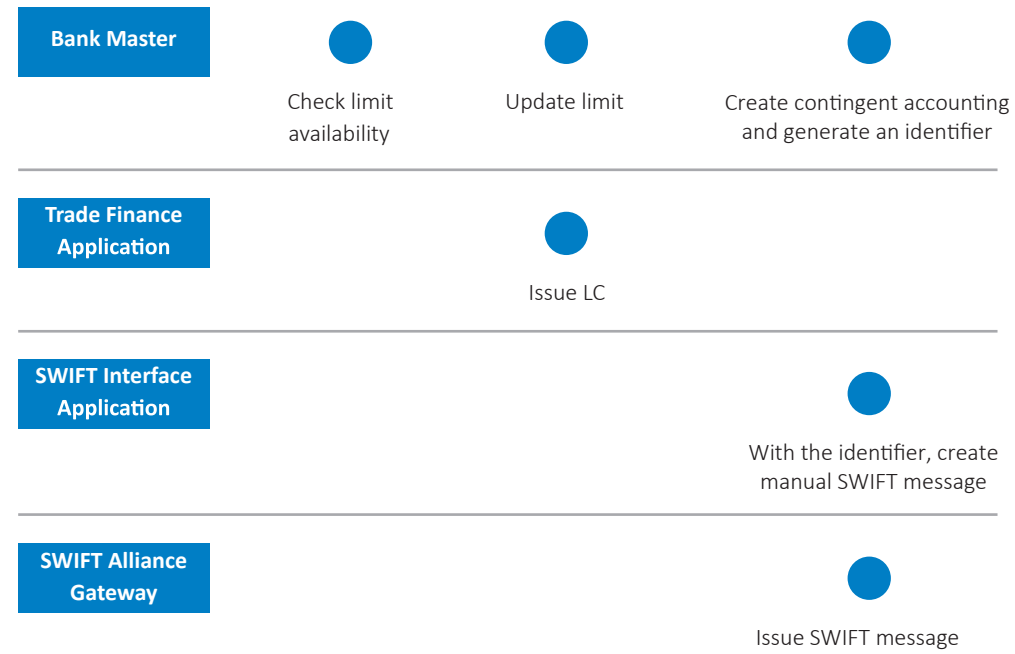5. Enabled the bank for new loan business
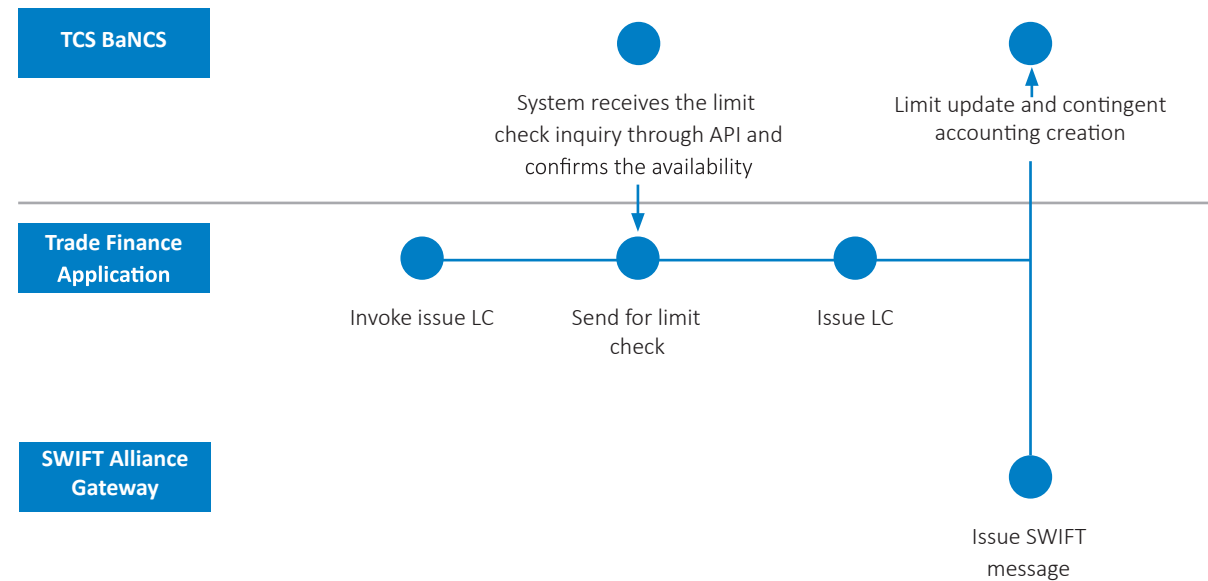
Loans NPA Management

Before

Bank Master

Create limit — Create and disburse a loan — Update limit

Excel Application

Loan turns overdue — Create a record for the loan account — Calculate the DPD and assign an asset classification

Reporting Application

Update the report for the loan account

After

TCS BaNCS

Create limit — Create and disburse a loan — Auto limit update — Loan turns overdue

System calculates the DPD and assigns an asset classification

Reporting Application

TCS BaNCS is integrated with reporting application and sends the data daily

LC Issuance

Before

Bank Master

Check limit availability — Update limit — Create contingent accounting and generate an identifier

Trade Finance Application

Issue LC

SWIFT Interface Application

With the identifier, create manual SWIFT message

SWIFT Alliance Gateway

Issue SWIFT message

After

TCS BaNCS

System receives the limit check inquiry through API and confirms the availability — Limit update and contingent accounting creation

Trade Finance Application

Invoke issue LC — Send for limit check — Issue LC

SWIFT Alliance Gateway

Issue SWIFT message

TCS provided a comprehensive solution to automate the monitoring of assets, account for bad loans, and report on Non-Performing Loans (NPLs) in full compliance with IRAC.

Chandan Tahiliani
Product Specialist,
TCS Financial Solutions (TCS BaNCS)

Revolutionizing digital contracts: TCS BaNCS' blueprint for seamless, democratized contracting

LENDING CONTRACT MANAGEMENT SCENARIO

Lenders must deal with a plethora of document templates. For example, the corporate credit department of a major European bank produced more than 350,000 loan and security documents. When we consider other departments and lines of business, document volumes can quickly grow to an unprecedented, and often unmanageable, level.

Yet the commercial lending business is poised for expansion, with one credit bureau reporting over 70% growth in Indian commercial loans. Furthermore, corporate borrowers, unlike retail/individual borrowers, require specific terms and conditions on both the lender's and the borrower's end. These factors heighten the challenge of managing document templates and loan documents.

Financial institutions need the agility and flexibility to customize document templates at speed and scale, while still ensuring specificity in specific contractual documents, appropriateness for the lending context, and compliance with regulatory guidelines.

1. **The documentation challenge in lending: Large volumes, disparate templates, and a long, error-prone production cycle**

Sheer volume

Contracting between borrowers and financial institutions (FI) involves numerous documents – loan agreements, terms sheet, security documentation, sanction letters, leasing agreements, offer letters, credit documents – as well as inward-facing documents such as credit assessment memorandum, executive summaries, and board resolution documents, just to name a few. The sheer volume of these documents requires intensive effort for production, as well as for corrections and periodic enhancements mandated by legal frameworks.

Subpar manual processes

In the absence of a systemic process, the chances are high that variations or errors make their way into templates, and the manual approach to data entry, formatting, production, review and verification further degrades documentation quality, while also increasing processing time, thereby increasing risk, degrading customer satisfaction, and placing workloads on people who can otherwise be deployed on higher-value tasks.

Inefficient legacy approach

Earlier attempts to systematize document production, such as data entry or editing applications that generate PDF or MS Word documents, enabled only minor improvements that were only slightly better than manual processes, especially for large-value contracts that go through an elongated review process with many iterations. The high turn-around-time

Outward Documents Capability Map
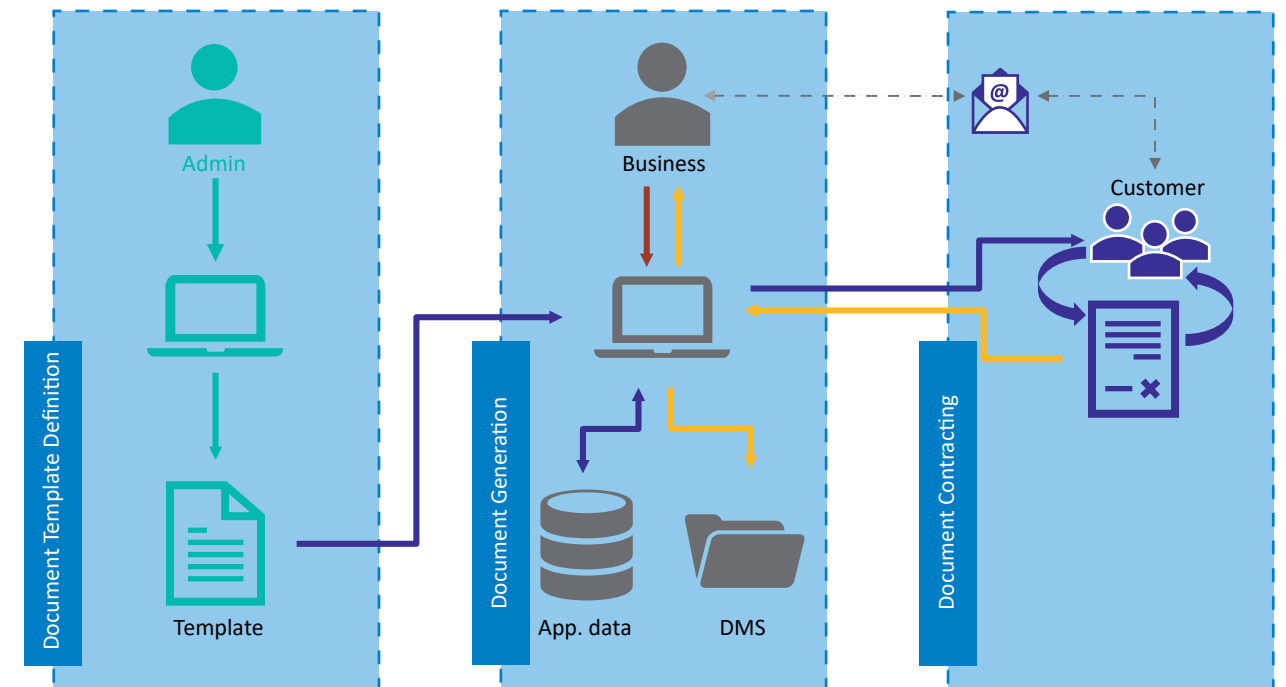
for document preparation and reaching stakeholder agreement appears even slower in an environment of rising customer expectations, with FinTech and neo-banks offering fast services and a superior customer experience.

Rigid change management and document templates

In the traditional approach to document management, FIs must rely on solution providers to enable and deploy changes. The change management process may take weeks before templates get rolled out to customers. This rigidity constrains the flexibility required in to handle the variations and specifics of lending.

2. TCS BaNCS reduces document production time; enhancing accuracy and collaboration

TCS BaNCS has pioneered a novel mechanism for managing the production of a large volume of contractual and assessment-related documents, putting document template management into the reach of virtually any financial institution.

With the solution, financial institutions manage templates on their own, without the intervention of IT departments and vendors, skipping burdensome change management efforts. Through a simple and secure web interface, credit administration and documentation teams have the immediate ability to define or update templates. The credit application process captures data from customers and automatically generates terms sheets, offer letters, facility letters, and other essential documents to be automatically sent directly to customers or filed into a document management system for further action. This frees up lenders to focus on client interactions rather than document production.

Centralized, business-friendly template management

In the traditional document management process, a single change may take a week or more. TCS BaNCS allows changes to go from production to deployment within hours. Document templates are managed through a a "no-code" template management framework that works with business-friendly MS Word document templates, giving administrators and business teams the power, agility and flexibility to compete in the credit lending business with fast turnaround times and an enhanced customer experience.

Eliminate errors and promote regulatory compliance

Manual updates to document templates often result in contracts that contain accumulations of minor changes from one document to another. Automated document production can provide 100% consistency with zero risk of error due to human oversight, improving regulatory compliance and mitigating potential risks.

Efficient process and improved accuracy

By automating document production, FIs can reduce manual employee work and create space for high-value, cognitive tasks, resulting in cost savings and improved operational efficiency that can help financial institutions to compete with Fintech and neobanks.

Collaborative, efficient platform

TCS BaNCS unlocks the power of collaboration across the full range of stakeholders, including credit teams, approvers, legal teams, compliance, and documentation officers. The stakeholders have centralized access to document templates, giving them the ability to work together iteratively throughout the complete document preparation cycle, entirely on the platform.

TCS BaNCS has pioneered a novel mechanism for managing the production of a large volume of contractual and assessment-related documents, putting document template management into the reach of virtually any financial institution.

Kunal Kumar
Product Consultant,
TCS Financial Solutions (TCS BaNCS)

Let's make some music

UNLOCKING THE LIMITLESS POSSIBILITIES WITH ULTRASONICS FOR FRICTIONLESS DIGITAL BANKING

In 2022, the total amount of smartphone shipments reached 1.21 billion units worldwide. Each smartphone has a speaker and a microphone. Additionally, 130 million households are home to at least one smart speaker, which is expected to rise to 335 million in the next 5 years. While it is unrealistic to be online 24/7 with no drops in coverage or speed—especially while traveling—losing connection can be a significant problem for organizations.

Can sound solve the problem?

While Alexa, Siri, and others have been around for a while and require a human being to communicate with them using voice. Now, just imagine if all these devices are able to communicate with each other when in proximity, without the need for office/network/wi-fi, and in a manner that is inaudible to the human ear.

Google's Nearby Messages API or Starbucks location beacons are high-frequency data-over-sound applications

that are popular with developers and users. However, these high-frequency beacons are not suited to delivering text and sensitive data because they are prone to interference from ambient sounds and heavily depend on the performance of the Digital-to-Analog converter (DAC) and the Analog-to-Digital converters (ADC).

Data-over-Sound (DoS), also known as Aerial Acoustic Communication (AAC) is a communication protocol that utilizes signals at the upper bounds of human hearing (above 15 kHz).

DoS can convert any existing speaker into a data transmitter and any device with a microphone into a data receiver. The basic idea of data-over-sound is no more complex than a traditional telephone modem. Data is encoded into an acoustic signal, which is then played through a medium (typically the air, although it could equally be a wired telephone line or VoIP stream) and received and demodulated by a 'listening' device.

This wireless communication protocol has advantages over the widely used Bluetooth and Wi-Fi for localized data exchanges within a small physical distance. It has advantages in terms of secure and localized data exchanges when compared to radio waves, given that the acoustic waves (periodic pressure disturbances) with wavelengths near the ultrasonic range do not pass-through barriers and are simply reflected off the walls of a typical room.

The only hardware DoS requires is a speaker and a microphone, which are present in audio-video equipment and every smartphone; and increasingly, in wearables, smart appliances, and IoT devices.

Data-over-Sound versus other methods

DoS opens a wide array of use cases across industries and has the potential to redefine user experience through seamless and frictionless user journeys. It is steadily gaining popularity in several industrial and consumer applications such as entry systems for public transport, contact-less payments, inventory management, and proximity-based customer engagement — all using sound waves.

Example: Sound-based authentication for banking

One of the many possible use cases is that of password-less authentication. Presently, two-factor authentication

The Following key features cover the most used protocols:

	DoS	QR	NFC	Bluetooth	Wi-Fi
Two-Way Communication	Yes	No	No	Yes	Yes
One-to-Many Broadcasts	Yes	No	No	No	No
Non-Line-of-Sight Transmissions	Yes	No	No	Yes	Yes
Broadcasts Confined to Room Boundaries	Yes	Yes	Yes	No	No
Typical Max Range	100m		20cm	100m	50m

mechanisms require the user to interact with the phone too- for example, to copy a verification code received through an SMS or an authenticator app to the browser, resulting in multiple steps and causing friction.

Let us look at the modern way of authentication. Password-less authentication is a method of verifying a user's identity without requiring them to enter a password. Instead, password-less authentication relies on other factors such as biometric authentication or a one-time code to verify the user's identity. Here are the steps involved in the password-less authentication process:

- The user initiates the login: Process on the mobile banking application or website.

- Identity verification request: The mobile banking application or website sends a request to the user's device to verify their identity using a biometric authentication method, such as facial recognition, fingerprint scanning, or voice recognition.

- Biometric verification: Confirms identity for verification.

- Token generation: If the user's identity is verified successfully, the mobile banking application or website generates a token that is sent to the user's device.

- Token validation: The user's device sends the token back to the mobile

banking application or website, which validates the token to confirm that it was generated by the correct user and device.

- Access granted: Once the token is validated, the user is granted access to their account.

Password-less authentication is becoming increasingly popular as it is considered more secure than traditional password-based authentication methods. It eliminates the risk of stolen or compromised passwords and reduces the need for users to remember complex passwords.

Here are the user journey steps for ultrasonic sound-based password-less authentication in a mobile banking application:

- The user initiates login: The user opens the mobile banking application and initiates the login process.

- Authentication request: The mobile banking application sends a request to the sound-based authentication server to verify the user's identity using unique sound patterns.

- Access granted: If the user's sound pattern is authenticated successfully, the server sends a response to the mobile banking application indicating that the user is authenticated, and access is granted to their mobile banking account.

Compared to the current ways of password-less authentication, no user action is required in the form of picking up the phone, typing in the OTP/Passkey, etc. Using DoS, the second authentication factor is the proximity of the user's phone to the device being used to log in. It uses ultrasonic sound waves to transmit encrypted digital data between two devices with a speaker and a microphone. Being ultrasonic and with the speaker's capability to recognize different frequencies, the perceived issues of being in a noisy area during the process are also minimal. Most importantly, this does not require interaction between the user and his phone. It also solves the problem of working with no/low network connectivity.

Is this Safe?

Is it possible to hack the data transferred through sound? DoS appears to be more secure than SMS OTP or Authenticator-based ones and makes up for the shortcomings of Bluetooth/NFC/QR-based methods.

Data-over-sound (DoS) is a technology that uses sound waves to transmit data. Here are some ways to secure data-over-sound transmissions:

- Use strong encryption: Encrypting the data before it is transmitted using sound-based communication is essential. Strong encryption ensures that the data cannot be read or decoded even if the transmission is intercepted.

- Verify the sender and receiver: The sender and receiver of data-over-sound transmissions should be verified to ensure that they are authorized. Sound-based communication systems can use sound signatures, like voice biometrics, to verify the sender and receiver's identities.

- Implement anti-jamming technology: DoS transmissions can be susceptible to interference or jamming from other sources. Anti-jamming technology can be used to protect against such interference and ensure reliable transmission.

- Use frequency hopping: Frequency hopping can be used to spread the signal across multiple frequencies, making it harder for attackers to intercept or interfere with the transmission.

- Limit the transmission range: Limiting the transmission range of the sound-based communication system can help prevent unauthorized access to the transmitted data.

- Regularly update the system: As with any security system, keeping the data-over-sound system up to date with the latest security patches and updates is crucial. Regularly testing and updating the system can help protect against new threats.

- By following these best practices, you can secure data-over-sound transmissions and ensure that your sensitive data is protected from unauthorized access.

DoS is one of the many ways to eliminate friction and by far the best use case for frictionless journeys right at the start.

Conclusion

By harnessing the power of sound, Data-over-Sound has emerged as a reliable and cost-effective way to exchange data between devices within a small physical distance. With the increasing number of smart speakers and connected devices in homes. Businesses, and public spaces, DoS is providing a host of opportunities for firms to increase their efficiencies, improve user experience and drive customer engagement.

DoS opens a wide array of use cases across industries and has the potential to redefine user experience through seamless and frictionless user journeys.

Subrato Bhattacharya
Senior Consultant,
TCS Financial Solutions (TCS BaNCS)

Frictionless payments journeys in Switzerland

SWISS PAYMENT PROCESSING – EVOLUTION TO FRICTIONLESS PAYMENT JOURNEYS


Some history and background

The Swiss domestic payments ecosystem is dominated by two large players, SIX and PostFinance, and they each process payments differently. The last seven years have witnessed many evolutions in the domestic payments ecosystem in Switzerland – migrating legacy formats in payment initiation and interbank processing, ISO 20022, unifying domestic payment clearing in SIC RTGS (Real-Time Gross Settlement), interoperability with SEPA CT (Credit Transfer), and SEPA DT (Debit Transfer).

On top of these evolutions, legacy payments slips have been decommissioned and replaced by the new QR-Code slip, the so-called QR-Bill providing depth of payment based on ISO 20022 elements.

ISO 20022 standards have set up the base for frictionless payment processing across the country, which adds up to more than 3 BN per year, making Switzerland a leading player in the adoption of ISO 20022 based payments.
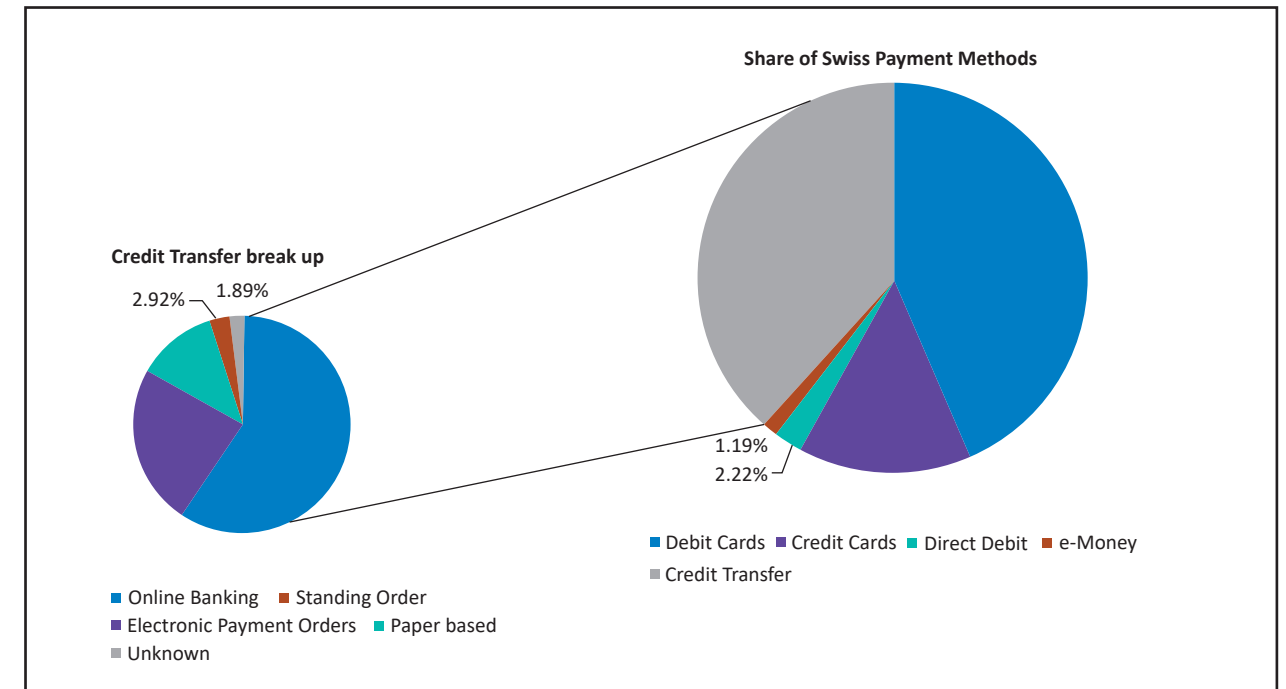
1) ISO format changes in the Swiss market

Challenge

SIX opted to support one version of the ISO 20022 message format in interbank message exchanges to help streamline domestic interbank processing.

The challenge for banks is to support previous and actual versions of ISO 20022 towards their customers for payment initiation (pain.xxx) as well account statements (camt.xxx) for both production as well as customer test environments. The response (pain.002) to customer credit or debit order initiation (pain.001/pain.008) needs to have the same version and related mapping. Also, large corporate customers with different applications for payment initiation or consumption of account statements need a period of coexistence of both formats to migrate all their systems to the new ISO version.

Resolution in TCS BaNCS

TCS BaNCS for Payments supports mappings to the corresponding standard release formats of supported schemes, e.g., SIC, SEPA, CBPR+. The interface layer maps the ISO message content to the product's internal processing model, decoupling the message content from the processing layer while supporting multiple ISO versions.

Previous formats of business functions are still available, and new capabilities target ISO versions implemented as per market standards or according to a bank's need.

For customer account statements, both previous and current versions of statements are created, and this co-existence will be supported until the migration to the new ISO version is completed. The supported and delivered account statement versions can be managed in the delivery instructions from the customer.

2) Swiss e-Bills

e-Bill is a SIX initiative that digitizes paper invoices. Billers can select from 18 providers to acquire their eBills, with eBill processing centralized in Paynet/eBill.ch. 2.7 MN payers presently use e-Bills, with 95% of banks in Switzerland supporting 400 MN of e-Bills efficiently processed in a year, with no reported fraud.

SIX and the Swiss banks are in discussions regarding a pilot in 2024 to transform Swiss domestic Direct Debit to eBills with mandate management and recall request by payers as a further evolution to streamline domestic processing.

eBill integration

Challenge

The existing eBill payers, once migrated to the new platform, receive new eBill participant identification. The next step is for the participating bank to map this eBill participant identification to the eBanking user ID of the payer. In the eBanking session, the customer can directly inquire about, approve, or reject the eBill. Within five seconds, the

approved eBill is visible as a pending payment order.

Paynet/eBill.ch acts as the initiating party and creates a payment order (pain.001) with dedicated mapping to payer bank. The bank needs to validate the payment and eBill participant identification to debtor account.

Resolution in TCS BaNCS

The existing order management for pain.001 based orders required the following enhancements, provided by TCS BaNCS:

- eBill payment order (pain.001) mapping used by the payment-initiating party Paynet/eBill.ch

- Additional validation of payer eBill participation, which requires integration of additional master data on debtor account.

- Streamlined and enhanced existing payment orders for express processing to provide turnaround time of five seconds for acquisition/validation, and additional notification on execution.

- Performance scaling to scope with the high volume of eBills.

3) Payment slip evolution to QR-Bill

As of September 2022, PostFinance, as owner of Swiss payment slips, in cooperation with SIX, mandated the switch from legacy payment slips to QR-Bills and their integration in e-Bills. The mandate was a bid to improve STP processing and improve references and acquisition usability with easy and error-free scanning that addresses the need for compliance like details of payer, beneficiary, ultimate debtor/creditor, structured address, and ISO 20022-based mapping.

The new QR-Bill is now the only domestic payment slip with structured

and unstructured remittance information (EU compatible SCOR and domestic QRR) used in Switzerland. It simplifies payments acquisition and processing while also reducing errors.

QR-Bill (payment slips)

Challenge

The legacy payment slips (IS = payment with no structured remittance for beneficiary with bank or postal accounts/ISR = payment with structured remittance) and related domestic message formats and processes were decommissioned with QR-Bill, the QR code-based slip.

QR-Bill content is ISO 20022 based, supporting remittance with structured and unstructured references. To scope with the existing structured reference to domestic ISR (red and orange payment slips), the same semantic was taken forward as QRR (QR reference) in the new QR-Bill. For interoperability reasons with SEPA payments, the SCOR reference was supported as well. The slips can be used with pre-printed transfer amount or free transfer amount. The slips support unstructured and structured addresses based on the ISO 20022 postal address to enable frictionless (and truncated) processing in domestic and cross-border payments.

Additional information as free text or structured text, bilaterally agreed or based on the SWICO specification, can be exchanged to streamline follow up processing of the payment between biller and payer.

Resolution in TCS BaNCS

In our study of the QR-Bill specification and related use cases, we discovered that QR-Bill is not just a mapping of a new payment slip. TCS made the following recommendations to our bank customers when implementing QR-Bill:

- To prevent fraud, the customer bank

must verify that the address held in the QR-code must be the same as in the plain text printed on payment slip on acquisition.

- If provided, the optional ultimate debtor needs to be manually captured during scanning or acquisition.

- The beneficiary IBAN has a different clearing number identification when structured reference QRR is used. IBAN for QRR is called QR-IBAN, through which clearing number identification is checked in SIC participant directory, providing additional opportunity for clearing IDs for a bank using QR-IBAN

- Bulk credit for corporates needs to be enhanced to support QR-Bill based payments.

SIC 5 platform and SIC IP (Instant Payment)

The SIC 5 platform uses ISO 20022 based message standards for domestic CHF and EUR customers and for FI2FI payments processing and clearing, enabling higher availability and instant payments.

SIC IP will be the first service implemented on the SIC 5 platform. SIC IP will be rolled out as a pilot in November 2023, and it will become mandatory for all SIC RTGS participants by end of 2026.

TCS BaNCS for Payments supports the recommended SWIFT CBPR+ conversion rules for all different address types, to prevent loss of or truncation of data.

The remaining SIC 4 services for RTGS in CHF/EUR will migrate in the next few years to SIC 5 platform.

Interoperability SIC – SEPA

Challenge

The bank must provide interoperability in domestic and SEPA payment processing.

In the 2022 standard release, SIC 4 RTGS moved to ISO 20022 v2019 for SEPA CT, leaving DT with the non-structured addresses of ISO 20022 v2009.

In the standard release in 2023, SEPA will be moving to the ISO 20022 v2019 format for both SEPA CT and DT.

Swiss customers may send payment orders (pain.001) in format v2009 or v2019, and co-existence with ISO v2009 for Swiss customers is allowed until November 2026.

Resolution in TCS BaNCS

TCS BaNCS for Payments uses ISO 20022 v2019, allowing both inbound and outward mapping for SEPA using either v2009 or v2019 formats. This allows structured addresses of internal models to be mapped to unstructured addresses for outward SEPA processing.

SIC 4 RTGS and SEPA messages use their own scheme-driven mappings, which are decoupled in TCS BaNCS integration layer towards payment processing. Processing follows the ISO 20022 baseline, which can be orchestrated to the banks' needs, following scheme-specific flavors.

Interoperability SIC - SWIFT

Challenge

SWIFT has set about its technical readiness journey with the first step of MT to MX migration, with the MT to MX co-existence phase planned to continue until November 2025.

The depth of information and referencing of transactions is considerably improved with MX formats. Structured addresses in MX have improved depth of data in comparison to legacy 'structured' addresses in MT format, which provides only the segregation of name, street and compound address line with postal code, town, and country.

During the co-existence phase, the bank can migrate stepwise from MT to MX, depending on their partner database in their core banking system. However, the depth of data from MT can impact the depth of information related to recall requests, return, cover payments in MX requests.

Banks using MT during the co-existence phase often have truncation issues (MT fields 70, 72 of customer and FI2FI payments). This topic was addressed by SWIFT PMPG, where a proposal was made for MT messages (MTx99) to forward, or claim, truncation and missing data. PMPG expects that less than 1% of SWIFT messages will be impacted by such truncation.

In interoperability of SIC – SWIFT corridor payments, the data truncation could block STP processing of intermediaries.

Resolution in TCS BaNCS

TCS BaNCS for Payments uses ISO 20022 for its internal operational model as well as for MT based payments. With the ISO 20022 database and enrichment of truncated MT fields out of MX, the information is sufficient for a smooth start with MX based exchange in the SWIFT network.

The data truncation of MT can be mitigated in two ways, which needs to be aligned with banks' requirements and their related cross-border businesses:
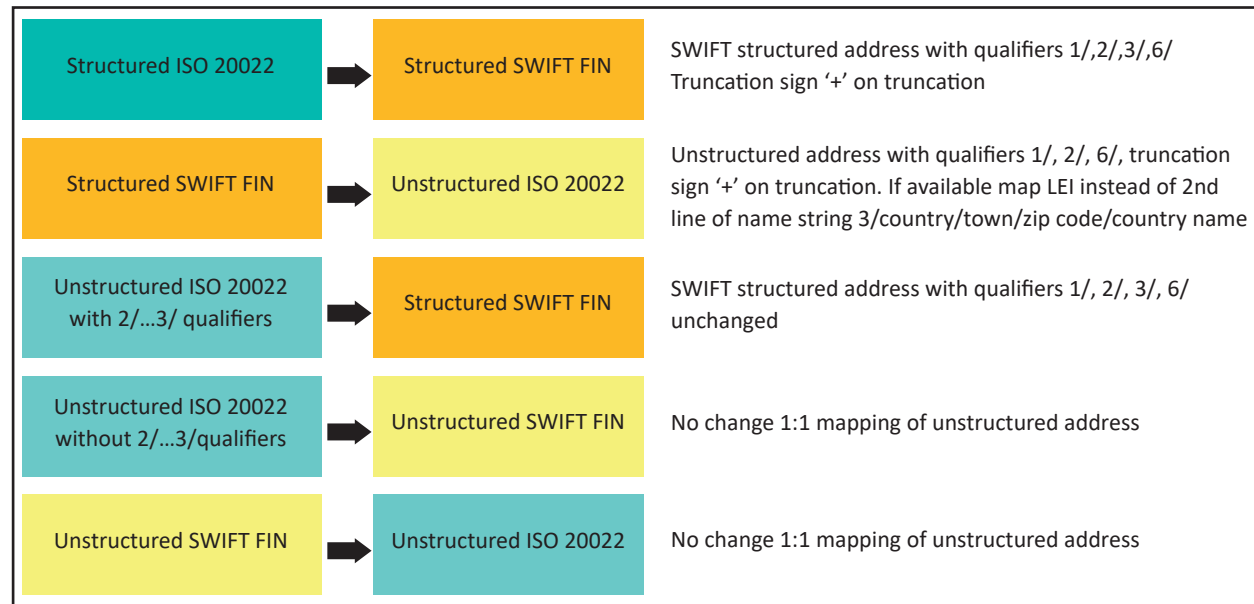

ISO 20022 standards have set up the base for frictionless payment processing across the country, which adds up to more than 3 BN per year, making Switzerland a leading player in the adoption of ISO 20022 based payments.

- Automatic enrichment of truncated MT fields out of MX message in SWIFT FINPlus in case of truncation in fields:

  o MT field 70: ultimate debtor/creditor, unstructured remittance information, previous instructing agent

  o MT field 72: previous instructing agent, instruction for creditor agent

- STP break of MT payments with truncated data. Enrichment of truncated MT fields out of MX message with MTx99 'data truncation' request to previous instructing agent to get full content of truncated data. The missing truncated data will be capture in the pending payment for further processing

TCS BaNCS for Payments supports the recommended SWIFT CBPR+ conversion rules for all different address types, to prevent loss of or truncation of data.

With TCS BaNCS for Payments, the ISO 20022 based operational model is a good anchor to support:

- Inward SWIFT MT or MX, mapped to ISO 20022 operational model,

Structured ISO 20022 → Structured SWIFT FIN	SWIFT structured address with qualifiers 1/,2/,3/,6/ Truncation sign '+' on truncation
Structured SWIFT FIN → Unstructured ISO 20022	Unstructured address with qualifiers 1/, 2/, 6/, truncation sign '+' on truncation. If available map LEI instead of 2nd line of name string 3/country/town/zip code/country name
Unstructured ISO 20022 with 2/...3/ qualifiers → Structured SWIFT FIN	SWIFT structured address with qualifiers 1/, 2/, 3/, 6/ unchanged
Unstructured ISO 20022 without 2/...3/qualifiers → Unstructured SWIFT FIN	No change 1:1 mapping of unstructured address
Unstructured SWIFT FIN → Unstructured ISO 20022	No change 1:1 mapping of unstructured address

further processed in SIC as interbank (pacs.00x, camt.0xx) message

- Inward SIC (pacs.00x, camt.0xx) message, mapped to ISO 20022 operational model, further processing in SWIFT as MT or MX message

- Outward SIC or SWIFT ISO 20022 messages based on TCS BaNCS operational model

Integration of SIC IP (Instant Payment)

Challenge

SIC IP is close to the SEPA Instant rulebook for happy flow payments promising a turnaround time of ten seconds, as well similar recall/return handling and status requests for payment/recall requests. SIX expects that participating banks' yearly downtime remain at 60 minutes outside the main traffic periods, which puts a heavy demand in terms of availability for the bank.

The primary differences between SIC IP and SEPA are:

- SIC IP is using ISO 20022 v2019

messages based on Swiss implementation guidelines. SEPA Instant will move in SR2023 to v2019 format.

- Transfer amount of SIC IP is CHF 20'000; SEPA Instant with EUR 100'000.-. The participating banks on SIC IP can bilaterally define different limits (lower than maximal transfer amount of SIC IP scheme)

- In SEPA Instant scheme, recall of an IP can be done within 13 months. In SIC IP no restriction of timeline for recall request of IP is defined, following existing SIC4 RTGS rules. According to current understanding, an IP recall can be done for a payment processed up to 10 years back. This has an impact on unique reference of transaction ID by instructing agent, which must be unique over 10 years.

- SIC IP Service as CSM (Clearing and Settlement Mechanism) checks uniqueness of IP based on transaction ID, message ID of instruction agent and rejection of duplicate transactions. Besides

the duplicate check on the level of CSM, the participating bank needs to establish a duplicate check to avoid double processing of IP due to operational issues on network or gateway connection.

- SIC IP settlement is not 7x24x365. It is following the SIC4 RTGS EOD processing and the SIC business calendar. On normal workdays, the day switch is around 18:20 h CET.

- SIC IP does not recommend any customer value dates. The expectation is that value date on the customer side is according to execution timestamp of IP, but interbank settlement is depending on the SIC IP settlement date, which is bound to SIC bank holiday calendar.

- SIC IP is a reliable real-time payment scheme but not yet embedded in a sound business case.

How will the Swiss market adapt to SIC IP?

Twint is already well introduced and established for P2P, C2B with no cost

on retail customer side. Will there be a transfer amount limitation for Twint and/or cannibalization of Twint in favour of SIC IP?

Switzerland has not yet defined a Request-To-Pay scheme, which could unify POS, ecommerce adaption.

Corporates are interested in real-time payments, but the transfer amount limit is actually too low, and the ERP of corporates are mostly not ready for 7x24 processing.

Resolution in TCS BaNCS

TCS BaNCS framework for real-time payments can help banks integrate SIC IP. It has supported instant payment schemes with tighter turnaround times like SWISH with two seconds. The solution uses microservices with silent updates to cover the need for high availability.

- Message exchange and follow-up events like cash block, booking, investigation, return, reject can be configured including timeout of these events It is always a challenge for a bank in the first implementation of instant payments to evolve their ecosystem towards high availability and shorter turnaround time for processing, especially in areas related to fraud and AML checks.

- Maximal transfer amount of scheme can be configured. Bilateral agreed transfer amount or threshold can be additionally defined by the bank.

- The retention time of IP in TCS BaNCS for Payments can be configured. If required, retrieval of payments out of banks archival system can be covered implementation specific to process recalls after retention time.

- To avoid duplicate processing of IP due to operational issues,

technical and functional check can be configured according to banks' requirements. This duplicate check works in addition to check done by SIC IP Service.

- The booking of SIC IP to customer account and SIC IP nostro for reconciliations is done based on settlement confirmation of SIC IP Service. Depending on banks' requirement' the customer value date can be based on timestamp of settlement execution, where SIC IP nostro is booked with settlement date as value date. The bank treasury needs to consider the discrepancy of customer value date and SIC IP nostro value date used for reconciliation.

- TCS BaNCS for Payments already supports some Request To Pay schemes, e.g., for SEPA Request to Pay, which could be adapted for the Swiss market. In Open Banking, real-time payments is a must for frictionless money flow in ecosystems. TCS BaNCS provides APIs to validate, execute and recall IP, which can be integrated in Open Banking.

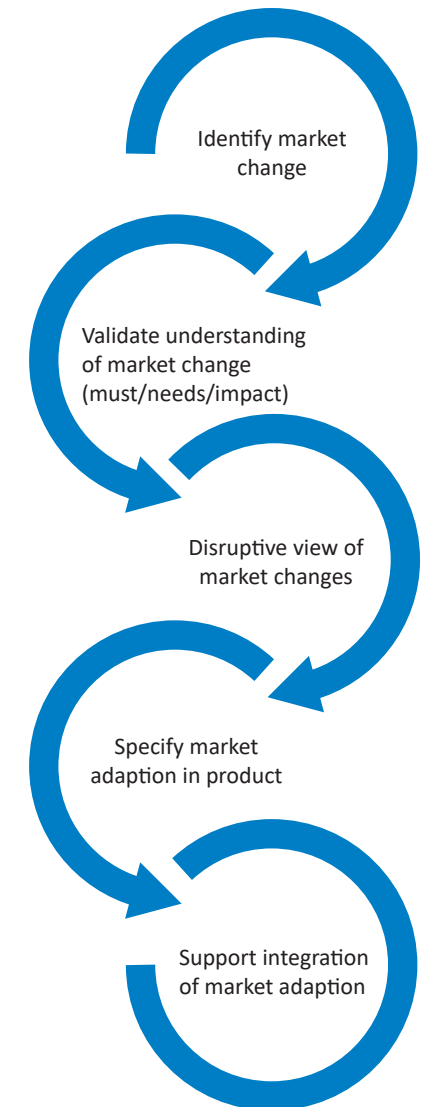**TCS BaNCS Approach towards Market-related Changes**

TCS BaNCS' Product Management follows a methodical approach to adapt and drive market innovation and regulatory changes. We are enhancing our product to cover market changes with added values like high STP with limited manual intervention, additional functionality required by the bank and support smooth integration in its ecosystem leveraging existing APIs.
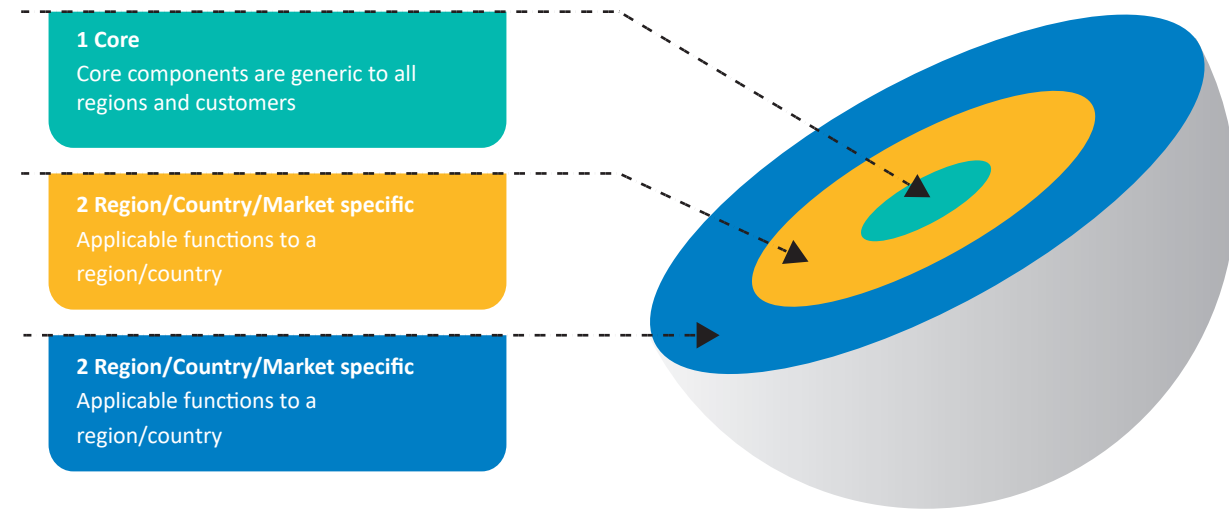
• Identify market changes

Regularly screen market innovation and regulatory changes. Publicly available or non-disclosed information of partner banks or standardization organization like SWIFT are used for such analyzes.

• Validate understanding of market changes

In dedicated banking working groups or with partner banks, TCS is validating their understanding of market changes and the associated impact in existing products offerings, STP processing (what needs to be adapted within TCS BaNCS), and related ecosystems (what needs to be adopted outside of TCS BaNCS).

Identify market change

Validate understanding of market change (must/needs/impact)

Disruptive view of market changes

Specify market adaption in product

Support integration of market adaption

1 Core
Core components are generic to all regions and customers

2 Region/Country/Market specific
Applicable functions to a region/country

2 Region/Country/Market specific
Applicable functions to a region/country

• Disruptive view of market changes

Based on a deepened and verified understanding, a disruptive way of integration of market innovation, new offerings, and ways of processing, e.g., linking with ML/AI, lean processing is explored and discussed within TCS BaNCS' Working Groups or with partner banks.

For example, real-time processing and Request-to-Pay schemes are driving new ways of event processing. ML/AI and digitalization are expected to gain more traction to streamline STP processing.

• Adapting to market needs

With the defined product scope revisited with disruptive view and impact of integration, the design is defined with respect to the reusability of existing capabilities, open gaps, and the parameterization of the product and services.

• Support integration of market adoption

TCS leverages its experience of other market implementations and lessons learned with partner banks to support

the integration and roll out of market specific changes at customer banks.

In previous chapters, we explained how the TCS BaNCS approach was applied.

Summary of resolutions in TCS BaNCS for frictionless payments journeys

Payment standards are evolving to be ISO 20022 based, and TCS BaNCS for Payments' internal processing models are already built on this standard. The product's software architecture and depth of functionalities, be it for credit or debit transfer, checks) with adaptation to a specific region/country (e.g. SEPA, SIC), is helping banks with the seamless processing of payments.

TCS BaNCS' service integration as an interface layer manages message exchanges used to process payments. It shields the different ISO versions and scheme related flavors towards payment processing. Different versions of ISO 20022 messages are only impacting payment processing, where business logic needs to be adapted. The existing integration in the bank's ecosystem could be further used or partially enhanced, where additional

information of the new version of the message is required.

Evolution of payment processing in Switzerland is a good showcase for how payment journeys can be supported in a frictionless way with TCS BaNCS for Payments.

Urs Meier
Solution Architect,
TCS Financial Solutions (TCS BaNCS)

From the editor

In this issue of the TCS BaNCS Research Journal, we cover a range of topics sharing our latest research and results from financial solutions that support customers from the smallest micro-business to the largest enterprise.

- In the front office, we demonstrate how to automate document production and reduced turn-around time in commercial lending; enable faster response times for investors in cross-border financial instruments; and expand financial inclusion for MSMEs.

- In the middle office, we show automated approaches to regulatory reporting for non-performing loans; describe a range of solutions for messaging and interoperability across various payments networks; and explore a new approach to authenticate identity using sound.

- In the back office, we show how a client eliminated ATM and POS downtime for quarterly software upgrades throughout a large transformation initiative; highlight benefits from a recent core transformation initiative; and imagine new applications for generative AI in payment processing.

What these research topics have in common is that they point toward the frictionless future of financial services.

Our mission at TCS BaNCS – "Creating frictionless digital financial journeys" – provides our entire team with a common understanding and sense of purpose, defining how we conceptualize, how we build, and how we deploy solutions.

We've made it frictionless for financial institutions to build their own customer journeys using our low-code development platform. By doing so, we've shortened the time between ideation and deployment. And we've made it frictionless for merchants to use our APIs, microservices and the TCS BaNCS Ecosystem, so that they can easily integrate financial transactions into broader consumer journeys. Using these tools, financial institutions can orchestrate customer journeys at scale, frictionless in facilitating transactions, frictionless in performing compliance and anti-fraud checks, and frictionless in omnichannel delivery.

When co-creating experiences with our financial institution partners, whether serving premium wealth management clients or small microlending clients, we are dedicated to frictionless delivery at the highest levels of quality and service.

We hope that this issue of the TCS BaNCS Research Journal inspires you to create frictionless digital financial journeys on behalf of your own customers.

Anjana Chandrika
Head – Marketing,
TCS Financial Solutions (TCS BaNCS)

Getting instant-payments ready with TCS BaNCS

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tcs BaNCS™

Creating friction-less digital financial journeys

Instant payments have empowered both consumers and businesses in ways unforeseen and are a foundational capability for any modern financial institution.

TCS BaNCS for Payments has been helping leading financial institutions meet growing customer expectations, be it facilitating instant payments or providing overlay services such as Request to Pay or integrating with white labelled apps.

From consolidating payments operations across Asia-Pacific for a large Japanese Bank, to supporting leading banks in the Middle East with their instant payments journeys, to providing on-demand scaling for a next-generation Indian Bank, the solution's advanced breadth and depth of capabilities, based on leveraging the cloud and 15020022 standards, have enabled progressive institutions to remain ahead of the curve.

Please scan the QR code to know more about TCS BaNCS